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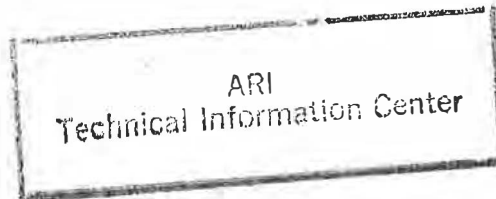
January 1, 1986, to September 30, 1989

With Author and Subject Index

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A Field Operating Agency Under the Jurisdiction
of the Deputy Chief of Staff for Personnel

EDGAR M. JOHNSON
Technical Director

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The primary responsibility of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) is to maximize soldier effectiveness. ARI accomplishes its mission through research and development in the acquisition, training, utilization, and retention of Army personnel. ARI research and products affect every Army mission with a human performance component. As convenient references for qualified agencies and individuals and sponsors, ARI publishes lists of its technical and research publications. This issue of the publication list describes reports published during the period January 1, 1986, to September 30, 1989. It contains the bibliographic information needed to identify a publication and the abstract of each publication. The abstracts have been written, as far as possible, to describe the principal research findings in nontechnical terms; however, technical language is used to communicate efficiently the details of research analysis. Author and subject indexing provides access to individual reports and topics.

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Research Reports and Technical Reports published by the U.S. Army Research Institute for the Behavioral and Social Sciences are intended for sponsors of research and development (R&D) tasks and for other research and military agencies. Any findings ready for implementation at the time of publication are presented in the last part of the Brief. Upon completion of a major phase of the task, formal recommendations for official action normally are conveyed to appropriate military agencies by briefing or memorandum.

Foreword

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) reports the findings of its research and investigations in its own series of publications. The number of these publications and the wide range of subjects they cover make the kind of list and indexes presented in this special publication both necessary and valuable.

EDGAR M. JOHNSON
Technical Director

List of U.S. Army Research Institute
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Contents

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Introduction

The primary responsibility of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) is to maximize soldier effectiveness. ARI accomplishes its mission through research and development in the acquisition, training, utilization, and retention of Army personnel. ARI research and products affect every Army mission with a human performance component.

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ARI Publications

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Research Note (RN). An interim or final report typically of limited interest outside of ARI. It is filed with the Defense Technical Information Center (DTIC) but is not printed. Research Notes usually fall into one of the following categories:

- An inhouse report that is of limited interest outside of ARI but is considered worth submitting to DTIC to be part of the Department of Defense (DoD) archive of technical documentation.
- An interim contract report that is of limited interest outside of ARI but is considered worth submitting to DTIC to be part of the DoD archive of technical documentation.
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- Material related to a Research Report or Technical Report (detailed tables, graphs, charts, sample forms, and sample training and testing materials) published as a Research Note to economize on printing and distribution.

Research Product (RP). A user-oriented report intended to aid Army personnel. Examples are handbooks, manuals, and guidebooks.

Research Report (RR). A report of completed research intended primarily for dissemination to military managers. Research Reports may deal with policy-related issues but typically do not include specific policy recommendations.

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Initial distribution of these publications was made directly by ARI. Research Reports, Technical Reports, and Research Products were distributed primarily to operational and research facilities and their sponsors in DoD, to other interested Government agencies, and to DTIC; copies of some reports were also sent to the Library of Congress for distribution to libraries participating in the Documents Expediting Project. Research Notes were deposited with DTIC but were not published.

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NOTE: *When requesting copies of these reports, please use the DTIC accession number* (AD _ _ _ _ _ _ _) *appearing in parentheses following the date of publication of each citation.*

Research Notes

RN 81-30 Utilization of Human Resources Data in Battlefield Automated Systems,
Kane, J.J.; Bean, T.T.; Dean, E.K. April 1986. (AD A167 860) This volume reports on how well human resources data (HRD) have been utilized in the development cycles of U.S. Army command, control, communications, and intelligence (C3I) systems. The incorporation of human resource issues was examined in the development cycles of two C3I systems: the Tactical Operations System (TOS) and the Stand-Off Target Acquisition System (SOTAS). The

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study concludes that effective use of HRD can be brought about only with early management recognition of the problems and with an appropriate focal point in the managerial team structure.

RN 86-01 The 1985 Army Experience Survey: Data Sourcebook and User's Manual, Westat, Inc. January 1986. (AD A173 826) There are many examples for attitude research, intelligence testing, and marketing analysis which demonstrate that individual attributes often require multidimensional measurements. Shye expands Guttman's ordered profiles to higher dimensionalities. Various levels of data complexity, structural relationships among test profiles, and predictions of specific test space are conducted through the use of scalograms. There is also a section of applied use for the technique examining such diverse constructs as expertise and affinity for major fields of education, preferred television watching, intelligence test comparisons, and consumer behavior in product choice and price comparability. Scalogram analysis does not operate on the basis of data reduction, but on the aggregation of numerous data comparisons.

RN 86-02 The Perception of Need for Counseling Among Successful Infantry OSUT Trainees and TDP Attrites, Schroeder, J.E.; Grunzke, M.E.; Slimowicz, C.J., Jr.; Kemery, E.; Williams, B. January 1986. (AD A168 178) The observation of a clinical paradox led to an inquiry into the nature of courage, and its relation to fear. In the course of carrying out some behavioral treatment programs, patients who are adversely affected by excessive fear are required to behave courageously, and they generally do so. This performance of courageous acts by fearful people suggest that we might more properly speak of courageous acts rather than courageous actors.

RN 86-03 Measurement of Productivity in a Research and Development Environment, Doherty, W.J. January 1986. (AD B100 943L) Difficulties associated with shiftwork affect personnel and mission effectiveness in various ways. Accordingly, shiftwork is a central concern for the U.S. Army, yet one which has become a burgeoning area for research only recently. The Army Research Institute's Basic Research Office provided assistance for the publication of these 20 papers, presented at the International Commission on Occupational Health's 1984 Edinburgh Symposium. The papers presented represent work done in eight European nations and the State of Israel. The conference organizers noted that the meetings were characterized by an interdisciplinary nature. Thus, some of the papers emphasize the relationship of physiology and clinical problems to shiftwork. Some research focused on cognitive, personality, and individual difference issues. Finally, many reports stressed sociocultural factors.

RN 86-04 Cost and Information Effectiveness Analysis: An Improved Methodology. Volume I, Hawley, J.K.; Brett, B.E.; Chapman, W.A. January 1986. (AD A165 844) This report presents the results of an effort to develop an improved methodology for the conduct of Cost and Information Effectiveness Analysis (CIEA). CIEA is a methodology for the evaluation of training device performance assessment capabilities (D-PACs). It is directed at the problem of determining when the worth of performance status information available from a D-PAC offsets the costs required to develop, operate, and maintain the capability. Such a determination may be needed in order to specify requirements for a D-PAC, or as a basis for

deciding between two or more D-PAC design options intended to satisfy pre-specified requirements. Following the introductory section, a review of objective procedures for the assessment of information worth is presented. An objective method for information worth evaluation based upon the use of Combat Simulation Models (CSMs) is then explored in detail. The results of this evaluation indicated that a CSM-based CIEA procedure, while technically feasible, is not practical. Section 3 of the report presents results from a series of formative tryouts of alternative multiattribute utility measurement (MAUM) procedures for the conduct of CIEA. Based upon these empirical results, recommendations for an improved MAUM-based CIEA methodology are made. The report continues with a detailed presentation of an improved methodology for the conduct of CIEA. In this improved methodology, a series of MAUM procedures are integrated into a standard cost-effectiveness framework. To illustrate the methodological description, an exemplary analysis on a set of hypothetical D-PAC alternatives is included. Finally, in section 5, issues relevant to the application of the improved CIEA methodology are discussed. Suggestions for future methodological development are also presented

RN 86-05 Cost and Information Effectiveness Analysis: An Improved Methodology. Volume II, Brett, B.E.; Chapman, W.A.; Hawley, J.K. January 1986. (AD A167 026) This report is the second of two volumes that present results of an effort to develop an improved methodology for the conduct of Cost and Information Effectiveness Analysis (CIEA). CIEA is a methodology for the evaluation of training device performance assessment capabilities (D-PACs). It is directed at the problem of determining when the worth of performance status information available from a D-PAC offsets the costs required to develop, operate, and maintain the capability. This report presents a case study which illustrates application of CIEA to evaluate a series of D-PAC alternatives that provide performance status information on the gunnery proficiency of crews for the Combat Engineer Vehicle (CEV). CEV gunnery D-PAC alternatives were developed by combining members of a set of interactive video gunnery trainers for the CEV with different types of live fire exercises. The case study describes activities conducted in the four phases of the CIEA of CEV gunnery D-PACs: exploration of the D-PAC concept for CEV gunnery, development of the D-PAC concept for CEV gunnery, definition of the CEV gunnery D-PAC alternatives, and evaluation of CEV gunnery D-PAC alternatives. Activities of the last phase culminate with specification of the most cost-effective CEV gunnery D-PAC alternative.

RN 86-06 The Computer-Aided Analytic Process Model: Operations Handbook for the Analytic Process Model Demonstration Package, Shapiro, R.G.; Bloom, R.F.; Oates, J.F., Jr. January 1986. (AD A166 180) The Computer-Aided APM demonstration provides the analyst with the opportunity to perform a thorough analysis of a system, while the computer keeps track of the analysis, and insures that the analyst examines the parts of the data base which are of interest. This is, however, a demonstration package which can only process small data bases. Because the package is implemented on an Apple II Plus, processing is relatively slow. An explanation of the APM listings of data sets derived using the APM and recommendations for further development of the APM model appear in the companion volume—"The Analytic Process Model for System Design and Measurement: A Computer-Aided Tool for Analyzing Training Systems and Other Human-Machine Systems."

RN 86-07 The Computer-Aided Analytic Process Model: Appendix to the Operations Handbook for the APM Demonstration Package, Shapiro, R.G. January 1986. (AD A166 400) The Computer-Aided APM Demonstration Package provides the analyst with the opportunity to perform a thorough analysis of a system while the computer keeps track of the analysis and insures that the analyst examines the parts of the data base which are of interest. This is, however, a demonstration package which can only process small data bases. Because the package is implemented on an Apple II Plus, processing is relatively slow. An explanation of the APM, listings of the data sets derived using the APM and recommendations for further development of the APM appear in the companion volume—"The Analytic Process Model for System Design and Measurement: A Computer-Aided Tool for Analyzing Training Systems and Other Human-Machine Systems." A separate companion volume—"The Computer-Aided Analytic Process Model: Operations Handbook for the APM Demonstration Package" is also available under separate cover. The present volume, which is an Appendix to the Operations Handbook, contains the actual PASCAL computer code listings. Disks containing this code and the data bases in machine-readable format are also available.

RN 86-08 Videodisc Interpersonal Skills Training and Assessment (VISTA) Topics Analysis and Scenario Development, Volume 2, Schroeder, J.E.; Dyer, F.N.; Czerny, P.; Youngling, E.W.; Gillotti, D.P. January 1986. (AD A166 866) The Videodisc Interpersonal Skills Training and Assessment (VISTA) project was initiated as a means to use computer-assisted training/videodisc technology to reduce the high training costs associated with junior officer leadership skills training. Historically the major problem was simulating subordinates as they would probably respond in a given leadership situation; assessment center simulations and role playing could train leadership skills but not without high personnel costs due to the numbers of counselors and role players required. Previous research indicated that a videodisc system could successfully train soldier skills even when only a fraction of the capabilities of the medium were used. Such a system could be used to supplement the current role playing and, hence, reduce the number of support personnel required. The research effort included topic analysis, hardware selection, software development, scenario writing, studio production, editing, and videodisc mastering. Final evaluation of the videodiscs produced included the administration of two tests, a test designed to measure the acquisition of leadership skills and a subjective preference test designed to measure user acceptance. Nine highly interactive videodisc training scenarios covering 20 leadership problems were produced. Overall evaluation results indicated a VISTA superiority followed by role playing and programmed text, with the majority of students indicating that a combination of videodisc and role playing would be optimal for leadership training. Results also indicate that although VISTA products were designed for the Infantry Officer's Basic Course, the problems addressed are probably common to other Army branches and should therefore be investigated for possible application in other training centers.

RN 86-09 Videodisc Interpersonal Skills Training and Assessment (VISTA): Scenarios, Volume 3, Schroeder, J.E.; Dyer, F.N.; Czerny, P.; Youngling, E.W.; Gillotti, D.P. January 1986. (AD A167 027) The Videodisc Interpersonal Skills Training and Assessment (VISTA) project was initiated as a means to use computer-assisted training/videodisc technology to reduce the high training costs associated with junior officer leadership skills training. Historically the major problem was simulating subordinates as they would probably respond

in a given leadership situation; assessment center simulations and role playing could train leadership skills but not without high personnel costs due to the numbers of counselors and role players required. Previous research indicated that a videodisc system could successfully train soldier skills even when only a fraction of the capabilities of the medium were used. Such a system could be used to supplement the current role playing and, hence, reduce the number of support personnel required. The research effort included topic analysis, hardware selection, software development, scenario writing, studio production, editing, and videodisc mastering. Final evaluation of the videodiscs produced included the administration of two tests, a test designed to measure the acquisition of leadership skills and a subjective preference test designed to measure user acceptance. Nine highly interactive videodisc training scenarios covering 20 leadership problems were produced. Overall evaluation results indicated a VISTA superiority followed by role playing and programmed text, and with the majority of students indicating that a combination of videodisc and role playing would be optimal for leadership training. Results also indicate that although VISTA products were designed for the Infantry Officer's Basic Course, the problems addressed are probably common to other Army branches and should therefore be investigated for possible application in other training centers.

RN 86-10 Videodisc Interpersonal Skills Training and Assessment (VISTA): Software and Evaluation Details, Volume 4, Schroeder, J.E.; Dyer, F.N.; Czerny, P.; Youngling, E.W.; Gillotti, D.P. January 1986. (AD A166 867) The Videodisc Interpersonal Skills Training and Assessment (VISTA) project was initiated as a means to use computer-assisted training/videodisc technology to reduce the high training costs associated with junior officer leadership skills training. Historically the major problem was simulating subordinates as they would probably respond in a given leadership situation; assessment center simulations and role playing could train leadership skills but not without high personnel costs due to the numbers of counselors and role players required. Previous research indicated that a videodisc system could successfully train soldier skills even when only a fraction of the capabilities of the medium were used. Such a system could be used to supplement the current role playing and, hence, reduce the number of support personnel required. The research effort included topic analysis, hardware selection, software development, scenario writing, studio production, editing, and videodisc mastering. Final evaluation of the videodiscs produced included the administration of two tests, a test designed to measure the acquisition of leadership skills and a subjective preference test designed to measure user acceptance. Nine highly interactive videodisc training scenarios covering 20 leadership problems were produced. Overall evaluation results indicated a VISTA superiority followed by role playing and programmed text, with the majority of students indicating that a combination of videodisc and role playing would be optimal for leadership training. Results also indicate that although VISTA products were designed for the Infantry Officer's Basic Course, the problems addressed are probably common to other Army branches and should therefore be investigated for possible application in other training centers.

RN 86-11 Literature Review–Army Training: M16A1 Rifle, TOW, and Dragon Weapon Systems, Smillie, R.J.; Chitwood, T.E., Jr. January 1986 (AD A168 190) A literature review and annotated bibliography were compiled to provide an introduction to the three Infantry weapon systems (M16A1 Rifle, TOW, and DRAGON antitank guided missiles), considering the three subsystems (training criteria, training content, and trainee

selection) within each system's training course. Two hundred and sixty-six documents were identified and abstracted: of these, one hundred and five are variously cited in the review narrative. The review describes and discusses the hardware, the hardware demands on the operator, current training programs, training criteria, measures of effectiveness, and training devices. The review showed that the current training for each weapon system (1) lacks continuity between institutional and unit training, ((2) has no correlation between training device proficiency and operational equipment proficiency, and (3) has no validated training program. It was concluded that training for the M16A1, TOW, and DRAGON can be effective only if complete training effectiveness analyses (TEAs) are conducted for each weapon system.

RN 86-12 How To Remotely and Automatically Score Trainfire Record Fire and Field Fire Ranges, Smith, S. January 1986. (AD A167 954) A major finding of recent rifle marksmanship research is that, in order to improve learning, the firer needs feedback about his shop-by-shot performance. Many efforts are underway to build more effective feedback into the instructional programs. One way to aid this process is the automation of various ranges (e.g., Record Fire). The purpose of this paper is to detail how much automation could be carried out using the current M31A1 TRAINFIRE Target Holding Mechanism. A simple modification of the mechanism, the addition of a hit indicating wire per target or lane, and a control panel, that includes hit registering capability, will permit automatic scoring. Various pieces of equipment could probably be adapted for the control system. Although not covered in the paper, an inexpensive microcomputer with a suitable interface could easily be utilized for control and scoring.

RN 86-13 Basic Rifle Marksmanship Trainer's Guide, Osborne, A.D. January 1986. (AD A168 362) The BRM Trainer's Guide provides the instructor with what are considered the current fundamentals of marksmanship in terms of general knowledge and skill acquisition techniques. The scope of the guide is initial entry marksmanship training; however, it is appropriate for use in any unit. The most important reason to field this guide is to provide information to trainers as quickly as possible. The contents of this guide will appear in Change Three of FM 23-9, M16A1 Rifle and Rifle Marksmanship once it is published. While much of the material reflects current thinking, it must be understood that continued research will result in further refinement in marksmanship training techniques.

RN 86-14 Training Extension Course Cost and Training Effectiveness Analysis Methodology, Sassone, P.G.; Bercos, J.; Holmgren, J.E. January 1986. (AD A168 212) This report addresses the development of a methodology for Training Extension Course (TEC) Cost Training Effectiveness Analysis (CTEA), where effectiveness is a function of *unit* performance as measured by the Army Training and Evaluation Program (ARTEP). This report deals specifically with the theoretical development of the methodology.

RN 86-15 Effects of Rifle Zero and Size of Shot Group on Marksmanship Scores, Taylor, C.J.; Dyer, F.N.; Osborne, A.D. January 1986. (AD A164 659) This research sought to determine the relative contributions of two factors on marksmanship performance. One factor, shot group size, is an index of a soldier's ability to apply the fundamentals of rifle marksmanship (aiming, trigger squeeze, etc.). The other factor, rifle zero, is an index of how well a soldier can place his or her shot group in reference to an aiming point (e.g., center of a

target). Our objective was to determine whether one of the factors was more responsible for poor marksmanship performance than the other.

RN 86-16 **Product Development and Utilization Within the Army Training System: Observations and Recommendations From Development and Implementation of the New Basic Rifle Marksmanship Training Program**, Holley, J.A.; Smith, S.; Osborne, A.D. January 1986. (AD A168 191) Through the development of a new Basic Rifle Marksmanship (BRM) Program of Instruction (POI) and the provision of technical assistance during its implementation, personnel at the U.S. Army Research Institute Field Unit at Fort Benning, Georgia (further references to this organization will be "ARI-Benning") had the opportunity to be involved with, and observe the organizational change process pertaining to, the utilization of a Research and Development (R&D) product within the Army training system. While the observations have implications for BRM POI sustainment, their broader implications are for managing change within the Army Training System. Given a POI with demonstrated effectiveness, an established need for the POI, a formal requirement for POI use, extensive technical assistance from the developer, and full cooperation of Headquarters, Training and Doctrine Command (HQ TRADOC) and its subordinate schools, US Army Infantry School (USAIS) and Army Training Centers (Forts Benning, Ga; Bliss, TX; Dix, NJ; Jackson, SC; Knox, KY; Leonard Wood, MO; McClellan, AL; and Sill, OK), problems still arose. Issues raised by the problems are generic to R&D product development and utilization within the Army training system, specifically management of that process at organizational levels of Headquarters, Major Commands (HQ, MACOMS, e.g., HQ, TRADOC) and their subordinate organizations (e.g., USAIS). In this report observations made during BRM POI development and implementation are integrated with scientific and applied literature to provide information directly applicable to research development and utilization within the Army Training System.

RN 86-17 **Ten Click Rule: A Test of the Effectiveness of a New Rule for Simplifying Battle Field Sight Adjustment**, Shake, L.G.; Schroeder, J.E. February 1986. (AD A168 797) This note contains the preliminary evaluation of a new rule to be applied for sight adjustment in the field. The new "ten-click rule" involves the heuristic of using the front sight post as a measuring instrument. The sight post equals 10 clicks of sight adjustment. The distance (in clicks) that a bullet strikes from the intended aiming point can be assessed at any range using the 10-click rule. It was found that the 10-click rule generally produced significantly less error in sight adjustment than the presently taught range-computation method. The 10-click rule also offers the advantages of being easily understood and recalled.

RN 86-18 **Annotated Bibliography and State-of-the-Art Review of the Field of Team Training as It Relates to Military Teams**, Dyer, J.L. February 1986. (AD A169 195) The purpose of this report is to give a broad overview of the field of team training as it relates to military teams. It includes an annotated bibliography and state-of-the-art review of research bearing on team training which covers the time period from 1955 to 1980. Critical conceptual and methodological issues are discussed in the review and discussion is focused on team performance rather than human relations variables. Categories of the annotated bibliography are organized to support the review. These include theories and models of team behavior, variables affecting team performance, military team training studies, methodology

for assessment of team products and processes, studies of the characteristics of effective and ineffective teams, and previous reviews of small group and team research.

RN 86-19 Analysis of M16A2 Rifle Characteristics and Recommended Improvements, Osborne, A.D.; Smith, S. February 1986. (AD A168 577) Based on five years of marksmanship-related research for the U.S. Army, the characteristics of the M16A2 rifle developed by the Marine Corps were analyzed to determine what impact new rifle features would have on Army marksmanship training and on combat effectiveness. It was found that use of the M16A2 rifle by the Army would be extremely problematic, a fact due, in part, to the vast differences between the marksmanship training philosophies of the Army and the Marine Corps. Numerous recommendations are presented which would result in simplified training and improved combat performance if adopted.

RN 86-20 Leadership Job Dimensions and Competency Requirements for Commissioned and Noncommissioned Officers. Remediation of Inadequacies in Existing Data Bases, Wallis, M.R.; Korotkin, A.L.; Yarkin-Levin, K.; Schemmer, F.M.; Mumford, M.D. February 1986. (AD A168 564) The objective of this research note is to identify non-technical leadership job dimensions and the assorted competencies needed for commissioned and non-commissioned officers. In order to meet this objective, the note develops a comprehensive job analysis data base for the description of Army leadership-related job tasks. The leadership knowledge, skills, abilities, and other characteristics (KSAOs) associated with successful performance were determined in order to develop a comprehensive model of generic job dimensions and skill requirements.

RN 86-21 Taxonomic Efforts in the Description of Leadership Behavior: A General Approach, Korotkin, A.L.; Mumford, M.D.; Yarkin-Levin, K.; Wallis, M.R.; Fleishman, E.A. February 1986. (AD A169 193) A literature review of previous taxonomies of leadership behavior was conducted and these taxonomies were found to be somewhat deficient. Therefore, an attempt was made to generate a more comprehensive taxonomic system for the description of leadership behavior. The approach used to develop this taxonomy was based on organizational systems theory and the concept that the major categories of behavior involved in problem solving should be considered as the basis for the taxonomy. The four categories of leadership that evolved were (1) Information Acquisition, (2) Information Use, (3) Managing People, and (4) Managing Things. This taxonomy was evaluated in accordance with the criteria described by Fleishman and Quaintance.

RN 86-22 Leadership in the Organizational Context: A Conceptual Approach and Its Applications, Mumford, M.D. February 1986. (AD A168 849) This paper reviews the literature on leadership, noting the lack of a well-founded theoretical conception of leadership that would provide a general cross-sectional approach to leadership identification and development. It is suggested that a systems approach might be used to gain some understanding of leadership as it occurs in an organizational context and that leadership focuses on the attainment of certain goals that can only be reached by using problem-solving capabilities. Leader characteristics and cognitive processes that are most facilitative of goal attainment are discussed as well as implications for leadership identification and development.

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Research Notes

RN 86-23 Development of a Single List of Leadership/Management Non-Mos or Branch Specific Tasks for Officers and Noncommissioned Officers, Wallis, M.R.; Mumford, M.D.; Korotkin, A.L. February 1986. (AD A168 875) This paper develops a consolidated list of leadership tasks performed by both officers and noncommissioned officers. This list was then reviewed by Army subject matter experts to identify common activities which could be grouped into behavioral dimensions. These dimensions were then used to assess the consolidated list and to develop some additional task statements. The final combined list of officer and noncommissioned officer tasks was then evaluated.

RN 86-24 Characteristics Relevant to Performance as an Army Leader: Knowledges, Skills, Abilities, Other Characteristics and Generic Skills, Mumford, M.D.; Yarkin-Levin, K.; Korotkin, A.L.; Wallis, M.R.; Marshall-Mies, J. February 1986. (AD A169 765) This paper reviews the results obtained in attempting to construct a taxonomic system capable of describing individual attributes that influence leadership effectiveness. To identify the knowledge, skills, abilities and other characteristics (KSAOs) as well as the generic skills involved, a literature review was conducted examining studies concerned with relevant problem-solving processes. A general taxonomy of KSAOs capable of influencing leadership effectiveness was constructed which was applicable to both officers and noncommissioned officers.

RN 86-25 Functional Hardware and Software Specifications for the Model Training Program for Reserve Component Units, Marco, R.A.; Israelite, L.; Gunderson, S. March 1986. (AD A168 826) The Model Training Program for Reserve Component Units (MTP-RC) is developing and evaluating state-of-the-art, computer-based troubleshooting and maintenance instruction. MTP-RC courseware was analyzed in order to identify those characteristics that were dependent on specific hardware and/or software capabilities. To determine the degree to which MTP-RC courseware is compatible with the Electronic Information Delivery System (EIDS), Army agencies were contacted in order to identify the functional specifications for EIDS hardware and software. In order to determine how the Hand Held Tutor could be used with MTP-RC courseware, the characteristics of the Tutor were identified. MTP-RC courseware was developed for delivery on the MicroTICCIT CBT systems. As a result, the hardware and software specifications describe the capabilities of MicroTICCIT.

RN 86-26 Advanced Terrain Representation for the MicroTICCIT Workstation: System Maintenance Manual, Decisions & Designs, Inc. February 1986. (AD A168 635) This report provides a technical description of the MicroTICCIT version of Decision and Design, Inc.'s (DDI) Advanced Terrain Representation (ATR) system. Topics covered in this report include theory of operation, installation, basic operations, and troubleshooting. The MicroTICCIT version of ATR is a device for training land navigation. This training is accomplished by having students use the system to "travel" over simulated terrain, review prerequisite skills, receive lessons in dead reckoning, and perform practice and test problems in navigation from one point on the ground to another. ATR is a microcomputer-based technology that utilizes laser videodiscs to provide a capability for fully interactive surrogate travel.

RN 86-27 Follow-Up of the Officer Evaluation Center, Mays-Terry, P.V.; Dyer, F.N.
March 1986. (AD A168 895) The Army conducted an Officer Evaluation Center at
Fort McClellan, Alabama, in early 1960's where about 900 first and second lieutenants
underwent three days of evaluation of their technical, administrative and combat skills. Over
2000 measures were taken from performance on 15 exercises. These observations yielded 341
variables which were reduced by factor analysis to 8 factors. In 1981, almost 20 years later, a
follow up was conducted. Results showed that OEC summary variables did yield significant
discriminant functions and small improvements in prediction over chance for groups of career
vs. single-term (2 year) officers.

**RN 86-28 Evaluation of A Spatial Data Management System for Basic Skills Educa-
tion: Phase 2**, Ramsberger, P.F.; Sticha, P.J.; Knerr, C.M.; Elder, B.L.; Rosenblatt,
R.D.; Parris, J.; Wagner, H.; Leopold, A.S. March 1986. (AD A167 879) The Army Basic Skills
Education Program needs materials to use in the Army Education Centers to instruct soldiers
in the skills and knowledges underlying their job task training. This project designed,
developed, and evaluated 12 videodiscs to teach study skills and test-taking strategies, spatial
orientation and navigational skills, and other learning strategies. Laboratory experiments
employed the SDMS materials to investigate the effects of learning strategies and learner
control, and of the way the instructional material is organized. Results indicated that the
subjects improved their spatial orientation skills after studying the spatial orientation and
navigational skills materials, but that the learning strategies and learner control had no
differential effects. A laboratory experiment and a field test investigated the effectiveness of
instruction in study skills, test-taking strategies, and test-anxiety reduction in enhancing the
ability of soldiers to learn military material. In the laboratory experiment, subjects received
different combinations of training in study skills, test-taking strategies, and test-anxiety
reduction. Training in study skills improved performance, but this improvement was not
maintained when study-skill instruction was combined with instruction in test-taking strat-
egies. Training in test-anxiety reduction was ineffective, both in reducing test anxiety and in
producing better performance. In the field experiment, subjects received training in either
learning strategies or spatial anxiety, with the instruction in spatial orientation skills produc-
ing greater reductions. However, neither study skill nor test-anxiety reduction training
produced differences in performance measures. Transfer of the SDMS technology from the
research context to the Army Education Centers required decisions regarding the microproces-
sor systems on which to base it and the evaluation of the system in the field. During the
experiments in the laboratory, SDMS was implemented on the Cromemco microprocessor
which was plagued with hardware problems. For the field experiment, conducted and at the
Fort Steward Education Center, SDMS was implemented on an Apple microprocessor to
provide more portable and more reliable delivery. Further applications required an assessment
of other microprocessors; therefore, this phase of the research performed an evaluative analysis
of potential systems. The main emphasis of the evaluation was the use of SDMS for basic skills
education, but general usage was also considered. Development of a checklist for evaluating
the SDMS for basic skills education had as its purpose the indication of the presence or absence
of factors related to technology transfer. The checklist development process considered three
stages of transfer: Adoption, implementation, and routinization. The original checklist, based
on a review of the technology transfer literature, was drafted in an earlier contract. It was
tailored to the evaluation of SDMS, but was too long for field use. Thus, in this project, the

checklist was refined and shortened. The final format had separate checklists for the viewpoints of the three main groups in the SDMS transfer process (researchers/developers, users, and managers/administrators).

RN 86-29 Intelligent Computer Assisted Instruction (ICAI): Formative Evaluation of Two Systems, University of California, Los Angeles. March 1986. (AD A167 910) This report reviews major components of an 18 month evaluation of Intelligent Computer Assisted Instruction (ICAI), and emerging field of Artificial Intelligence that draws on computer technologies and cognitive science in an attempt to build more powerful instructional programs. The primary goals of this effort were to develop an increased understanding of the state of the art of ICAI for the purposes of: (a) identifying strategies to enhance the general usefulness of ICAI technology for Army training problems, and (b) developing concepts for efficiently and effectively managing military ICAI projects. The approach taken to accomplish these goals was to intensely examine two selected ICAI systems using a formative evaluation methodology. The two systems selected were: (a) PROUST, a system designed by Soloway and Johnson for analyzing bugs in novice programmers' PASCAL programs, using a top-down approach which attempts to infer the intentions and plans of the programmer, and (b) WEST, a system designed by Burton and Brown to teach basic mathematics and strategic thinking skills, based on the premise that students can learn from their mistakes or "bugs". Formative evaluation is specifically designed to examine instructional processes and outcomes with particular attention to identifying programmatic strengths and weaknesses and formulating strategies for improvement. More specifically the studies focused on: (1) the product development cycle employed, including the institutional orientations of the designers and their sources of motivation; (2) the characteristics of the instructional strategies employed and the content addressed; and (3) empirical testing of the programs to determine what students learned and whether the program was more or less effective with certain types of students. The report concludes with an analysis of lessons learned on the conduct of formative evaluations of emerging instructional technologies and strategies currently in use to develop ICAI programs. Suggestions are provided for increasing the effectiveness of ICAI products, for better aligning ICAI project design and military training needs, and for facilitating the management of future procurements and associated formative evaluation projects.

RN 86-30 Sensitivity to Visual Motion in Statistically Defined Displays, Sekuler, R.W.; Williams, D.W.; Harp, S.A. March 1986. (AD A167 291) This project explored several related aspects of how human observers perceive moving targets, particularly targets whose motion is "apparent" rather than continuous.
ORIGINS OF GLOBAL MOTION PERCEPTS. When several different, local motion vectors are intermixed the result may be a percept of global, coherent motion. We exploited this discovery in order to develop a better understanding of the mechanisms that support the perception of motion. Our experiments used specially developed stimuli presented by computer control. The stimuli were random-dot cinematograms made up of 512 elements (bright dots on a cathode ray tube). From one frame of the display to the next, each element took an independent, random walk. All steps in the random walk were of constant size and the directions of these steps were drawn from a uniform distribution. When shown stimuli in which different, local motion vectors were mixed, observers tended to see a global, coherent flow along the mean of the uniform distribution of directions. This perceptual tendency varied inversely

with the range of the distribution. Standard psychophysical techniques were used to obtain psychometric functions for cinematograms having various step sizes and spatial densities of their elements. A wide range of conditions produced results that were consistent with a modified version of S. Ullman's "minimal map theory" of motion correspondence.

SIZE FACTORS IN APPARENT MOTION. We tested the idea that the system creating the percept of motion makes use, at an early stage, of information about size. The size information was presumed to arise from size-tuned mechanisms with fairly broad bandwidths in the domain of spatial frequency. To test this hypothesis, we used stimuli whose luminance profile was a difference of Gaussians (DOGs). Such stimuli are spectrally band-limited and therefore should differentially stimulate size-tuned mechanisms. In one study, adjacent DOGs of varying size were alternated in a simple apparent motion display. When DOGs were of the same size, they were more likely to elicit reports of motion. This preference for size similarity was found under a range of display conditions. The generality of this finding was tested under other conditions. The central DOG stimulus alternated with two flanking DOGs. The central DOG could participate in motion with one, both, or neither of the observers' reports of apparent motion recorded. In general, the relations discovered with the two DOG case held for this more complex display. A mathematical model was developed to account for the results. The model conceptualizes apparent motion as resulting from a competition between simultaneous tendencies to see motion in several different directions. The model supports the idea that an early stage in the processing of apparent motion is the extraction of information about the visual size of the stimuli.

RN 86-31 Research on Interorganizational Decision Making Within a British Airport, Heller, F. March 1986. (AD A167 332) The research investigated the complex process of decision making over time, its effectiveness and achievement. Participation by lower level employees and high status of consultative committees are characteristic of democratic effective decision making. Other major influences are Meta Power (external influences) and Turbulence (uncertainty). A key finding is the existence of four fairly clearly recognizable phases of the decision cycle. The variables under investigation in decision making show significantly different impact in the four phases.

RN 86-32 Twenty-Four Hour Structure of Vigilance Under Prolonged Sleep Deprivation: Relationship With Performance, Lavie, P. March 1986. (AD A167 399) The present study investigated the 36th structure of sleepiness and its relationship with psychomotor performance after 28h of sleep deprivation. Eight subjects, aged 19 to 25 years, participated after spending two adaptation nights in the sleep lab. Subjects came to the lab at 2300 and remained deprived of sleep until 1100. At 1100 a schedule of either 7 min sleep attempt in bed, 13 min awake outside the bedroom, or 7 min resisting sleep in bed, 13 min awake outside the bedroom, was begun and maintained for 36h until 23h on the next day. The order of the two experimental conditions, which were separated by two weeks, was counterbalanced. Polyhypnographic recordings were carried out during the 7-min "in bed" periods, and psychomotor testing (one and two-handed reaction time tasks) was conducted in the middle of the 13-min wake periods. In agreement with our previous studies, there were small and nonsignificant differences between the amounts of sleep in each condition. Subjects slept 51% of the time in the attempting sleep condition and 48% of the time in the resisting sleep condition. The structure of sleepiness peaks: a midafternoon peak, and a major nocturnal peak,

and two "forbidden" zones for sleep at approximately 1100h, and between 1900 and 2100h. The results of the sleep data are described in great detail in Appendix 1. Significant circadian effects were found for the two components of the psychomotor performance: reaction time and movement time. The difficulty level of the task only significantly affected movement time, in both experimental conditions. The experimental condition (attempting vs. resting sleep) had a significant effect on the speed of reaction time and on the stability of movement time. For all levels of tasks' difficulty, performance was poorer in the resisting sleep condition. There was no interaction however between the level of difficulty and the circadian variations. In spite of the great similarity between the circadian variations in sleepiness and the circadian variations in performance, correlating these two variables for 12h blocks revealed random and nonsignificant correlations. This negates a causal relationship between the amount of sleepiness and performance, and suggests that both are modulated by a common underlying circadian oscillator.

RN 86-33 Human Problem Solving in Fault Diagnosis Tasks, Rouse, W.B.; Hunt, R.M. April 1986. (AD A167 397) This report evaluates the nature of human problem solving abilities specifically related to fault diagnosis situations. Three types of fault diagnosis were analyzed involving diagnosis utilizing both real equipment and computer simulated equipment failures. In addition, the investigators experimented with computer generated problem solving aids to supplement human decision making capacities in diagnostic tasks. Results of the initial investigation indicate that human problem solving tends to be highly context-specific but that pattern recognition capabilities are exceptional allowing for a high degree of accuracy in ambiguous problem solving situations. Both structured-oriented and strategy-oriented problem solving aids were analyzed. Structured-oriented bookkeeping aids clearly improved performance, while strategy-oriented aids actually had a negative effect on transfer of training. This research effort is clearly relevant to military interests in effective training of optimal decision making in sub-optimal conditions. The results strongly support further research into the nature and training of effective problem solving.

RN 86-34 Assessment and Training of Student Learning Strategies, Weinstein, C.E. April 1986. (AD A167 271) This chapter focuses on a subarea of learning-to-learn phenomena called learning strategies. Learning strategies are considered to be any behaviors or thoughts that facilitate encoding in such a way that knowledge integration and retrieval are enhanced. These thoughts and behaviors constitute organized plans of action designed to achieve a goal. Examples of learning strategies include actively rehearsing, summarizing, paraphrasing, imaging, elaborating, and outlining. This report presents a categorical scheme for conceptualizing learning strategies. Next, some issues related to assessment and research methodologies are presented. Finally, approaches to teaching learning strategies are discussed.

RN 86-35 Meditation: Rationales, Experimental Effects and Methodological Issues, Brener, J.; Connally, S.R. April 1986. (AD A167 330) This report provides a critical evaluation of the published work on meditation. It consists of four major sections: Mystical Aspects of Meditation, Psychological Effects, Physiological Effects and Methodological Issues. It is found that Western versions of meditation diverge significantly in their rationales and purposes from the Eastern practices on which they are based. In the East, meditation is a religious practice that has spiritual goals. Although it has retained a mystical flavour in the

West, it is employed primarily as a means of counteracting the stresses of modern life. This application of meditation is thought to operate by inducing a state of bodily and mental relaxation mainly through the control of attention and the regulation of breathing. There is some evidence that meditative techniques have therapeutic value in protecting against the pathogenic effects of stress. However, it is not proven that they are significantly more effective than other behavioral methods for inducing relaxation. Nether are the physiological or psychological effects of meditation different from those associated with relaxation. Furthermore the effectiveness of both meditation and these other relaxation techniques appears to be strongly influenced by factors which have not been systematically investigated such as the beliefs of subjects and their confidence in the techniques.

RN 86-36 Leadership and Multidimensionality, Streufert, S. April 1986. (AD A167 894)
In this chapter, the author explores the rationale for the following suggestions: that leaders must be able to empathize (i.e., perceive and understand employees and relevant others appropriately), that the executive leader should be able to communicate effectively, and that appropriate and effective leadership action generally has to be based on differentiative and integrative thinking, perceiving, and planning. Questions about how differentiation and integration are useful, when and where multidimensionality is needed, and what must be differentiated to achieve leadership excellence are all addressed.

RN 86-37 Transfer of Movement Control in Motor Skill Learning, Schmidt, R.A.; Young, D.E. April 1986. (AD A167 912) This chapter is concerned with transfer of learning in situations involving the kinds of responses that are defined primarily as motor behaviors. The authors focus on situations where movement control is learned and transferred to some other situation. Complimentary treatments of the motor and cognitive bases of transfer are offered. Definitional and experimental design questions surrounding transfer are discussed as are a number of important principles of motor behavior and motor control which have emerged in the past few decades. Principles of movement control are also discussed in terms of understanding some of the phenomena seen in transfer of learning situations.

RN 86-38 Leadership: Where and What Is Leadership Excellence?, Streufert, S. April 1986. (AD A167 821) Leadership represents the interpersonal component of managerial activity. As such, it has to do with leading people, not directly concerned with technical skills or even making excellent decisions. Included is a discussion of addressing leadership at various levels of the organizational hierarchy, how different tasks and different followers necessitate different leadership styles, and how understanding others and communicating with others represent an art of leadership that is aided by a multidimensional integrative approach to tasks and followers.

RN 86-39 Toward a Better Understanding of the Acquisition of Skill: Theoretical and Practical Contributions of the Task Approach, Schmidt, R.A. April 1986. (AD A175 377) During the 1970's and 1980's, the field of motor learning generally abandoned the so-called task-oriented tradition, in which the effect of various experimental conditions on task performance or learning were evaluated. It is by a process-oriented viewpoint, in which the dominant focus was the understanding of various underlying processes or mechanisms in performance and learning. Such a shift has resulted in many changes, such as a focus on

relatively simple tasks where the underlying processes could be more easily identified, manipulated, and understood; and, it emphasized the concern for very fundamental research questions. It is argued here that this shift has not been particularly healthy for motor learning, because the tasks that were used have had questionable external validity, and the theories that were developed and evaluated were not maximally suited to the understanding of the phenomena of practice and learning. Two research programs noted deal with the effects of conditions of practice and feedback/knowledge of results, both of which offer a return to the task orientation.

RN 86-40 Doing Business With Words Performative Aspects of Deontic Systems, Stamper, R.K.; Lee, R.M. April 1986. (AD A167 876) The data-processing approach to business applications of computers is being displaced by an IKBS paradigm. It is argued that an even better approach will account for the ways in which the reality of business is actually created by the information system. This new view arises from the study of decision support systems and among its key concepts are performance and deontic structures. Deontic systems are systems of obligations such as one finds in social systems in general and business systems in particular. Performatives are ways of signifying changes that people want to make in the deontic structure. In business, very often there are special documents to function as performatives. The mechanical transmission of signals from one machine to another is quite different from the communication of intentions that takes place between persons. A communication act consists of a meaningful utterance (an illocution) and an intention to change the obligations or expectations of others (a performative). These concepts are introduced in the context of an examination of the governance of economic transactions among organizations. Of special practical use is the possibility of using rules to represent organizational knowledge quite independently of the application programs that normally, today, contain a confusing mixture of computational and business factors.

RN 86-41 Data Collection Via a Quasi-Experimental Simulation Technology: I. Multiple Measurement of Performance Excellence in Complex and Uncertain Managerial Tasks, Streufert, S.; Pogash, R.M.; Piasecki, M.T. April 1986. (AD A167 949) A simulation technique is used to determine whether complexity (multidimensionality) of task performance in complex managerial tasks is trainable. The present report is strictly concerned with measurement. Previous simulation based measurement (cf. Streufert, 1983) which had included sixteen measures was extended to thirty-seven primary measures and twelve derived measures. Information is provided on the characteristics and purpose of each of those measures. In addition formulas or related statements that allow calculation of performance scores by other researchers and/or other settings is provided. Further, this report considers the Time-Event Matrix on which measurement is based.

RN 86-42 The 1984 ARI Survey of Army Recruits: Codebook for Summer 84 Active Army Survey Respondents, Westat, Inc. June 1986. (AD A170 827) The ARI Survey of Army Recruits [more commonly known as the New Recruits Survey (NRS)] is conducted to obtain information on the characteristics, enlistment motivations, attitudes, and knowledge of recruits at the point of their initial entry into the U.S. Army. The eleven reports in the 1984 series include user's manuals, codebooks (which focus on data file documentation,

including special variables, and use of the survey data available from respondents), and tables of survey results. They are: RN 86-46. *The 1984 ARI Survey of Army Recruits: User's Manual.*
RN 86-47. *The 1984 ARI Survey of Army Recruits: User's Manual for October 84 / February 85 Administration.*
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RN 86-43. *The 1984 Survey of Army Recruits: Codebook for Summer 1984 USAR & ARNG Survey Respondents.*
RN 86-44. *The 1984 ARI Survey of Army Recruits: Codebook for October 84 / February 85 Active Army Survey Respondents.*
RN 86-45. *The 1984 ARI Survey of Army Recruits: Codebook for October 84 / February 85 USAR & ARNG Survey Respondents.*
RP 86-09. *The 1984 ARI Survey of Army Recruits: Tabular Description of NRS (Active) Army Accessions, Volume 1.*
RP 86-10. *The 1984 ARI Survey of Army Recruits: Tabular Description of NRS (Active) Army Accessions, Volume 2.*
RP 86-11. *The 1984 ARI Survey of Army Recruits: Tabular Description of NRS Army National Guard Accessions.*
RP 86-12. *The 1984 ARI Survey of Army Recruits: Tabular Description of NRS Army Reserve Accessions, Volume 1.*
RP 86-13. *The 1984 ARI Survey of Army Recruits: Tabular Description of NRS Army Reserve Accessions, Volume 2.*
A comparison of the methodologies used in the 1984 and 1985 administration of the NRS, together with recommendations for future surveys, appears in: TR 706. *The 1984 and 1985 ARI Survey of Army Recruits: Methodology and Recommendations for Future Administration.* Reports based on the 1982 and 1983 administration of the NRS are also available.

RN 86-43 The 1984 ARI Survey of Army Recruits: Codebook for Summer 84 USAR and ARNG Survey Respondents, Westat, Inc. May 1986. (AD A170 731) The ARI Survey of Army Recruits [more commonly known as the New Recruits Survey (NRS)] is conducted to obtain information on the characteristics, enlistment motivations, attitudes, and knowledge of recruits at the point of their initial entry into the U.S. Army. The eleven reports in the 1984 series include user's manuals, codebooks (which focus on data file documentation, including special variables, and use of the survey data available from respondents), and tables of survey results. They are:
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RN 86-44. *The 1984 ARI Survey of Army Recruits: Codebook for October 84 / February 85 Active Army Survey Respondents.*
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RN 86-44 The 1984 ARI Survey of Army Recruits: Codebook for October 84/February 85 Active Army Survey Respondents, Westat, Inc. June 1986. (AD A170 791)
The ARI Survey of Army Recruits [more commonly known as the New Recruits Survey (NRS)] is conducted to obtain information on the characteristics, enlistment motivations, attitudes, and knowledge of recruits at the point of their initial entry into the U.S. Army. The eleven reports in the 1984 series include user's manuals, codebooks (which focus on data file documentation, including special variables, and use of the survey data available from respondents), and tables of survey results. They are:

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RN 86-42. *The 1984 ARI Survey of Army Recruits: Codebook for Summer 84 Active Army Survey Respondents.*

RN 86-43. *The 1984 ARI Survey of Army Recruits: Codebook for Summer 1984 USAR & ARNG Survey Respondents.*

RN 86-44. *The 1984 ARI Survey of Army Recruits: Codebook for October 84/February 85 Active Army Survey Respondents.*

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RN 86-45 The 1984 ARI Survey of Army Recruits: Codebook for October 84/February 85 USAR and ARNG Survey Respondents, Westat, Inc. June 1986. (AD A171 235) The ARI Survey of Army Recruits [more commonly known as the New Recruits Survey (NRS)] is conducted to obtain information on the characteristics, enlistment motivations, attitudes, and knowledge of recruits at the point of their initial entry into the U.S. Army. The eleven reports in the 1984 series include user's manuals, codebooks (which focus on data file documentation, including special variables, and use of the survey data available from respondents), and tables of survey results. They are:

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RN 86-46 The 1984 ARI Survey of Army Recruits: User's Manual, Westat, Inc. May 1987. (AD A181 919) This is one of eight reports produced to document the 1984 Summer administration of the ARI Survey of Army Recruits, familiarly known as the New Recruit Survey. This volume describes the project background, instrument development and content, survey administration, and database construction. Technical appendixes contain copies of the four survey forms, survey administration instructions, the physical layouts of the databases, and a crosswalk of survey variables appearing on the 1983, 1984, and 1985 survey

instruments. Other reports in this series document more completely the survey databases, and detail the selection and creation of additional variables. The tabular descriptions present preliminary results of the Summer 1984 administration by component. A combined methodology report compares procedures employed in the 1984 and 1985 survey administrations. Various reports are also available for the 1982, 1983, 1984 (Winter), and 1985 administrations.

RN 86-47 The 1984 ARI Survey of Army Recruits: Supplementary User's Manual for October 84/February 85 Administration, Westat, Inc. May 1986. (AD A172 701)
The ARI Survey of Army Recruits [more commonly known as the New Recruits Survey (NRS)] is conducted to obtain information on the characteristics, enlistment motivations, attitudes, and knowledge of recruits at the point of their initial entry into the U.S. Army. The eleven reports in the 1984 series include user's manuals, codebooks (which focus on data file documentation, including special variables, and use of the survey data available from respondents), and tables of survey results. They are:

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RN 86-44. *The 1984 ARI Survey of Army Recruits: Codebook for October 84 / February 85 Active Army Survey Respondents.*

RN 86-45. *The 1984 ARI Survey of Army Recruits: Codebook for October 84 / February 85 USAR & ARNG Survey Respondents.*

RP 86-09. *The 1984 ARI Survey of Army Recruits: Tabular Description of NPS (Active) Army Accessions, Volume I.*

RP 86-10. *The 1984 ARI Survey of Army Recruits: Tabular Description of NPS (Active) Army Accessions, Volume II.*

RP 86-11. *The 1984 ARI Survey of Army Recruits: Tabular Description of NPS Army National Guard Accessions.*

RP 86-12. *The 1984 ARI Survey of Army Recruits: Tabular Description of NPS Army Reserve Accessions, Volume I.*

RP-86-13. The 1984 ARI Survey of Army Recruits: *Tabular Description of NPS Army Reserve Accessions, Volume II.*

A comparison of the methodologies used in the 1984 and 1985 administration of the NRS, together with recommendations for future surveys, appears in:

TR 706. *The 1984 and 1985 ARI Survey of Army Recruits: Methodology and Recommendations for Future Administration.* Reports based on the 1982 and 1983 administration of the NRS are also available.

RN 86-48 The 1985 ARI Survey of Army Recruits: Codebook for Summer 85 Active Army Survey Respondents, Westat, Inc. May 1986. (AD A171 788) The ARI Survey of Army Recruits [more commonly known as the New Recruits Survey (NRS)] is conducted to obtain information on the characteristics, enlistment motivations, attitudes, and knowledge of recruits at the point of their initial entry into the U.S. Army. The eight reports

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RN 86-49. *The 1985 ARI Survey of Army Recruits: Codebook for Summer 85 USAR & ARNG Survey Respondents.*

RN 86-50. *The 1985 ARI Survey of Army Recruits: User's Manual*

RP 86-14. *The 1985 ARI Survey of Army Recruits: Tabular Description of NPS (Active) Army Accession, Volume I.*

RP 86-15. *The 1985 ARI Survey of Army Recruits: Tabular Description of NPS (Active) Army Accessions, Volume II.*

RP 86-16. *The 1985 ARI Survey of Army Recruits: Tabular Description of Army National Guard Accessions.*

RP 86-17. *The 1985 ARI Survey of Army Recruits: Tabular Description of NPS Army Reserve Accessions, Volume I.*

RP 86-18. *The 1985 ARI Survey of Army Recruits: Tabular Description of NPS Army Reserve Accessions, Volume II.*

A comparison of the methodologies used in the 1984 and 1985 administration of the NRS, together with recommendations for future surveys, appears in TR 706. *The 1984 and 1985 ARI Survey of Army Recruits: Methodology and Recommendations for Future Administration.* Reports based on the 1982 and 1983 administration of the NRS are also available.

RN 86-49 The 1985 ARI Survey of Army Recruits: Codebook for Summer 85 USAR and ARNG Survey Respondents, Westat, Inc. May 1986. (AD A171 961) The ARI Survey of Army Recruits [more commonly known as the New Recruits Survey (NRS)] is conducted to obtain information on the characteristics, enlistment motivations, attitudes, and knowledge of recruits at the point of their initial entry into the U.S. Army. The eight reports in the 1985 series include user's manuals, codebooks (which focus on data file documentation, including special variables, and use of the survey data available from respondents) and tables of survey results. They are:

RN 86-48. *The 1985 ARI Survey of Army Recruits: Codebook for Summer 85 Active Army Survey Respondents.*

RN 86-49. *The 1985 ARI Survey of Army Recruits: Codebook for Summer 85 USAR & ARNG Survey Respondents.*

RN 86-50 *The 1985 ARI Survey of Army Recruits: User's Manual*

RP 86-14 *The 1985 ARI Survey of Army Recruits: Tabular Description of NPS (Active) Army Accessions, Volume I.*

RP 86-15 *The 1985 ARI Survey of Army Recruits: Tabular Description of NPS (Active) Army Accessions, Volume II.*

RP 86-16 *The 1985 ARI Survey of Army Recruits: Tabular Description of Army National Guard Accessions.*

RP 86-17 *The 1985 ARI Survey of Army Recruits: Tabular Description of NPS Army Reserve Accessions, Volume I.*

RP 86-18 *The 1985 ARI Survey of Army Recruits: Tabular Description of NPS Army Reserve Accessions, Volume II.*

A comparison of the methodologies used in the 1984 and 1985 administration of the NRS, together with recommendations for future surveys, appears in: TR 706. *The 1984 and 1985 ARI Survey of Army Recruits: Methodology and Recommendations for Future Administration.* Reports based on the 1982 and 1983 administration of the NRS are also available.

RN 86-50 The 1985 ARI Survey of Army Recruits: User's Manual, Westat, Inc. May 1986. (AD A172 624) This is one of eight reports produced to document the 1985 summer administration of the ARI Survey of Army Recruits, familiarly known as the New Recruit Survey (NRS). This volume describes the project background, instrument development and content, sample design, survey administration, and database construction. Technical appendixes contain copies of the four 1985 survey forms, ARI letter to the reception stations containing survey support requirements, the physical layouts of the survey databases, and a crosswalk of survey variables appearing on the 1983, 1984, and 1985 NRS instruments. Other reports in this series are available which more completely document the survey databases, detailing the selection and creation of additional variables. The tabular descriptions present preliminary results of the Summer 1985 administration by Army component. A combined methodology report compares procedures employed in the 1984 and 1985 survey administrations.

Various reports are also available for the 1982, 1983, and 1984 administrations.

RN 86-50. *The 1985 Survey of Army Recruits: User's Manual.*

RN 86-48. *The 1985 Survey of Army Recruits: Codebook for the Summer 85 Active Army Survey Respondents.*

RN 86-49. *The 1985 Survey of Army Recruits: Codebook for the Summer 85 USAR & ARNG Survey Respondents.*

RP 86-14. *The 1985 Survey of Army Recruits: Tabular Description of NPS (Active) Army Accessions, Volume I.*

RP 86-15. *The 1985 Survey of Army Recruits: Tabular Description of NPS (Active) Army Accessions, Volume II.*

RP 86-16. *The 1985 Survey of Army Recruits: Tabular Description of NPS Army National Guard Accessions.*

RP 86-17. *The 1985 Survey of Army Recruits: Tabular Description of NPS Army Reserve Accessions, Volume I.*

RP 86-18. *The 1985 Survey of Army Recruits: Tabular Description of NPS Army Reserve Accessions, Volume II.*

A comparison of the methodologies used in the 1984 and 1985 administrations of the NRS, together with recommendations for future surveys, appears in: TR 706. *The 1984 and 1985 ARI Surveys of Army Recruits: Methodology and Recommendations for Future Administration.* Reports based on the 1982 and 1983 administrations of the NRS are also available.

RN 86-51 Development of Parallel Learning Strategies Curricula Using Videodisc and Standard Off-Line Formats, Ramsberger, P.F.; Harris, C.D.; Knerr, C.M.; Hopwood, D. March 1986. (AD A168 712) The Department of Defense (DOD) initiated programs to implement the Defense Science Board Summer Study (1982) recommendations for emphasis on the application of advanced technology for training, collection and analysis of data on cost and effectiveness of training, and enhanced transfer of instructional technology. The objectives of this project in support of the DoD initiatives were to: (1) develop interactive videodisc

instruction for Army enlisted personnel to learn problem solving strategies and include it and the previous videodisc lessons in an integrated learning strategies curriculum, (2) develop a parallel curriculum in a standard paper-pencil format for use at locations without videodisc equipment and to facilitate future media comparisons in evaluations planned by the US Army Research Institute (ARI), and (3) create a videotape presentation of the videodisc instruction that has been sponsored by ARI. Since 1980, HumRRO has conducted research and development to produce and evaluate applications of an advanced multimedia, computer-based technology for basic skills education, which included 12 videodiscs for interactive instruction. That work indicated the need for an integrated curriculum to teach learning strategies and problem solving skills to enlisted personnel. To meet that objective, the first task of this project was to develop interactive videodisc instruction in problem solving skills and to design a video overview as a link among the various lessons. To provide a parallel form of instruction and to support further evaluations, the second task was the preparation of printed, off-line materials for all of the lessons. The last task was the production of two videotapes, one a short summary and the other a twenty-minute presentation of the videodisc work that ARI has sponsored. The products of this developmental project were: two videodiscs and the related instructional software to train problem solving strategies and grouping as a learning strategy to Army personnel, and an overview to integrate the entire learning strategies curriculum; a parallel curriculum of off-line materials for use in locations without the needed hardware for videodisc presentation and for a media comparison evaluation; and a set of videotapes to describe ARI videodisc instructional projects.

RN 86-52 Through-The-Sight Video: Equipment and Concepts for Gunnery Training, Morey, J.C.; Rollier, R.L.; Graber, J.G.; Salter, J.A.; Salter, M.S. January 1986. (AD A168 661) The phrase "through the sight video" (TSV) denotes a relatively recent application of existing video and optical technology. When the device is integrated with the Bradley Infantry Fighting Vehicle (BIFV) Integrated Sight Unit (ISU), the optical display that is seen simultaneously by the gunner and commander is transmitted also to a video camera/recorder. This provides a means for duplicating the exact sight picture to a remote video monitor and/or to video tape for permanent storage. The capabilities of the device in field settings was explored and the conclusion is that TSV shows promise in a number of training and research areas related to BIFV gunnery, tactics and techniques. Future work should be planned and implemented to further develop the TSV device for BIFV-specific training. The prototype TSV should be explored further in future research to develop procedures, lesson plans and audio visual materials for gunnery training applications and applications related to tactics and techniques for BIFV small unit leaders.

RN 86-53 Evaluation of a Spatial Data Management System for Basic Skills Education: Phase 1, Ramsberger, P.F.; Hopwood, D.; Hargan, C. S.; Underhill, W.G. April 1986. (AD A167 952) As part of the Army's continuing effort to deal with the basic skill deficits of some soldiers, the Human Resources Research Organization (HumRRO) has been evaluating the Spatial Data Management System (SDMS) as a tool for basic skills education. The SDMS is a computer-based videodisc system with an easy-to-use information location and accession software package. A key focus of HumRRO's effort has been to identify the special design requirements for creating interactive videodisc educational materials. Certain elements were found to be essential in developing successful interactive videodisc educational materials.

These include the need to focus on the highly motivational characteristics of video and the need to devote much attention to the content and sequence of feedbacks to student responses. Also important is the need for a well-organized design process to account for the highly integrated nature of all aspects of the process—design, scripting, production, post-production and programming. This report is a case study of the project's first phase, with emphasis on the instructional design issues involved.

RN 86-54 A Conceptualization of Driving Behavior as Threat Avoidance, Fuller, R. May 1986. (AD A168 101) A behavioral analysis of the threat-avoidance model of driver behavior is analyzed. This suggests that what a driver does depends in particular on the rewards and punishments for alternative responses when confronted with a discriminative stimulus for a potential aversive event. Implications of the model for the learner driver, road safety measures, and earlier conceptualizations of driver motivation are discussed.

RN 86-55 Nonimposed Overpractice and Skill Retention, Jones, M.B. April 1986. (AD A168 572) The question at issue in this research note is the role of "nonimposed overpractice" in predicting individual performance in skill retention of reacquisition. "Nonimposed overpractice" refers to the shape of individual performance curves late in acquisition. The flatter a curve is, and the longer it remains flat, or nearly so, the more that the individual has overpracticed the task. The overpractice is "nonimposed" because there is no external constraint or scoring convention that prevents further improvement. Performance flattens out (shows little or no further improvement) because the individual has reached his or her internal limits.

RN 86-56 Evaluation of a Flight Surgeon Course Syllabus Change, McAnulty, M.D. May 1986. (AD A168 824) In November 1983, the syllabus for the Flight Surgeon flight training program was changed from a solo flight to a formal checkride evaluation at the 14-hour level. A preliminary investigation indicated that the syllabus change might negatively affect the training program by reducing its attractiveness to potential applicants or by reducing student attitude, motivation, and performance during flight training. During 1984, all Flight Surgeon students completed an "Incentive Factors Survey" before beginning the course. After completing the course, the instructor pilots rated each of their students on a "Flight Training Survey." The most important application incentives to the majority of the Flight Surgeon students were the opportunities to enhance their military careers, to receive flight training, and to study aviation medicine. The opportunity to fly solo was an important, positive incentive to 22% of the students, but 31% of the students were either indifferent to or negatively influenced by a solo flight opportunity. The remaining 47% of the students indicated that the solo flight opportunity was a modest, positive incentive. The flight training ratings indicated that student attitudes and motivation levels were not only satisfactory, but were generally above average when compared to previous Flight Surgeon students. Ratings of student performance were generally commensurate with ratings of the student's ability. In summary, the negative effects of the syllabus change were neither pervasive nor severe. No compelling evidence was obtained to revert to the solo flight syllabus.

RN 86-57 Analysis of Gunnery Training for the Bradley Infantry Fighting Vehicle, Strasel, H.C.; Lockhart, D.C.; Hilligoss, R.E.; Fusha, J.A. May 1986. (AD A169 239)

This report examined areas of potential improvement to gunnery training evident during the initial stage of introduction of the Bradley Infantry Fighting Vehicle to U.S. Army units. The analysis consisted of a synopsis of available literature on gunnery requirements and tasks; an overview of then-current training practices, programs of instruction, and training resources; and consideration of available and projected training devices. This analysis provided a basis for selection of specific topics for further research to aid in the development of gunnery training programs, gunnery rules and procedures, and approaches to the evaluation and refinement of gunnery training devices.

RN 86-58 Training for Night/Limited Visibility Operations, Graber, J.G.; Rollier, R.L.; Salter, J.A. April 1986. (AD A168 827) Although training directives dictate that one-third of all tactical training be conducted under limited visibility conditions, examination of current Bradley Infantry Fighting Vehicle (BIFV) unit training schedules indicated that this was not being done for a variety of reasons. Field personnel queried by research team members indicated that the conduct of training specific to limited visibility conditions is hampered by the lack of adequate guidance on the optimal content and methods for such training. A proposed Night Training Program (NTP) was developed to fill the presently existing void in guidance to BIFV units for conducting limited visibility training. The program integrates material presently existing in scattered form into a coordinated approach to BIFV unit night operations training.

RN 86-59 Courseware Design for 19K BNCOC, Jay, J.; Bernstein, K. March 1986. (AD A169 236) The purpose of this report was to describe an instructional design model to be applied to five 19K Basic Noncommissioned Officer Course tasks that will be converted to computer-based training and to apply the model to two prototype lessons. The objectives for each of the five tasks selected by the Army Research Institute were analyzed to determine the behavioral domain and instructional requirements of each. All five tasks were found to require procedural simulations using a manual or job aid. A review of currently available MicroTICCIT instructional models was conducted to determine if any existing model could be used. No models were found to satisfactorily match the instructional requirements for these tasks, so a unique instructional model was designed using Courseware Engineering techniques. A procedural simulation model was developed to be used as a guide for developing the selected 19K BNCOC tasks. Each lesson developed using this model would contain three types of components: 1) topic introductions, 2) parts of the system instruction, and 3) procedural simulations. The procedural simulations include a Pretest, a Guided Demonstration, Practice Simulations, and a Posttest. All simulations are interaction intensive, requiring the student to simulate steps or answer questions on virtually every display. The simulations may differ in circumstances, outcomes, type of prompts and type of feedback. Two prototype lessons were developed to illustrate how the model is applied to specific 19K BNCOC content. The prototype lessons were selected as representative of the procedural tasks identified to be included in this program. The prototype lessons developed were "Use an IM 174-A/PD Raiacmeter" and "Prepare and Submit a NBC-4 Report". The approved model will be applied to other selected 19K procedural tasks, including "Prepare and Submit a NBC-1 Report", "Use an M256 Chemical Kit", and "Read and Report Radiation Dosages".

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RN 86-60 Continuous Operations SOP for BIFV Units, Graber, J.G.; Rollier, R.L.; Salter, J.A. May 1986. (AD A169 191) Based upon the analysis of the Threat and the emerging role of the Bradley in combined arms operations, it is apparent that there is a clear need for increased Bradley Infantry Fighting Vehicle (BIFV) unit awareness of the combat-relevant aspects of continuous operations. This need must be met by providing small unit leaders with appropriate tools for preparing to survive and fight under conditions of prolonged operations. One of these tools is a Continuous Operations (CONOPS) Annex To Company Tactical Standing Operating Procedure. This SOP provides guidance suitable for establishing a routine work/rest schedule that units can use immediately to improve sleep discipline. Placing guidelines for the conduct of continuous operations in the hands of leaders at company/platoon/squad levels will increase awareness of the issue and provide a tool for evaluating unit implementation of continuous operations procedures during unit ARTEPS.

RN 86-61 Developments in Efficiency Analysis, Charnes, A.; Cooper, W.W.; Golany, B.; Schmitz, E.; Sherman, H.; Stutz, J. May 1986. (AD A168 588) Concepts of efficiency analysis are extended through the Data Envelopment Analysis method to include new theoretical characterizations of Pareto optimal production functions, solutions of such problems as economies of scale, non-concavity and isotonicity, discretionary and non-discretionary inputs, multiplicative efficiency formulations (piecewise Cobb-Douglas), and comparisons to alternatives such as ratio and regression analysis.

RN 86-62 Development of Interactive Videodisc Instruction for Problem Solving and Armor Skills, Knerr, C.M.; Ramsberger, P.F.; Harris, C.D.; Wetherby, C.S.; Hannaman, D.L.; Hopwood, D.; Burnside, B.L.; Phelps, R.H. May 1986. (AD A170 893) The Department of Defense has initiated programs to implement the recommendations of the Defense Science Board Summer Study (1982). These programs emphasize the application of advanced technology to training, and training technology transfer. Objectives of this project in support of the programs were to: (1) develop interactive videodisc instruction for Army enlisted personnel, to help them learn problem-solving strategies, (2) create a videotape to present information about the videodisc instruction that the Army Research Institute has sponsored, (3) support training technology transfer at the Armor School and Center. The products of this developmental project were two videodiscs which, together with their associated instructional software, were designed to train problem-solving strategies to Army enlisted personnel, materials for media comparisons of the contractor's videodisc instruction, a set of videotapes describing ARI videodisc instructional projects, and a needs analysis of diagnostic testing and remedial training for an enlisted personnel course.

RN 86-63 An Evaluative Report on the Current Status of Parapsychology, Palmer, J. May 1986. (AD A169 486) This report constitutes a critical review of eight major research areas in the field of parapsychology over the past twenty years. The report begins with a philosophical analysis of the way research questions in parapsychology are formulated. It is concluded that the claim to have established psi in the sense of paranormality can be rejected a priori because of the generally conceded absence of a confirmed paranormal theory. Given this fact, the important question becomes whether the observations reported by parapsychologists have adequate conventional explanations or whether they are true anomalies. The methods and results of each research project are summarized, along with whatever

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criticisms of these projects that have been published. This material is then critically evaluated from the point of view of assessing what conventional mechanisms could conceivably account for these findings and the adequacy of these mechanisms as explanations. In general, its is concluded that despite some methodological shortcomings and inadequate reporting, parapsychologists have succeeded in documenting genuine anomalies worthy of scientific interest. Reliable application of whatever paranormal process these anomalies might represent is unlikely until this process (if it exists) is better understood.

RN 86-64 "Sleepability" and "Wakeability" Following Sleep Deprivation, Lavie, P. May 1986. (AD A169 578) This research note discusses experiments investigating the infrastructure of arousal during the habitual waking day following one night of total sleep deprivation. Based on the data collected during the experiment, it can be concluded that "wakeability", the ability to remain awake, and "sleepability", the ability to fall asleep, following sleep deprivation, are not complimentary processes, but are probably governed by different mechanisms. The practical implications of these results to the scheduling of replacement naps are discussed.

RN 86-65 Media Selection Analysis for 19K BNCOC, Jay, J.A. June 1986. (AD A169 670) This report describes the analysis of 19K BNCOC objectives and identifies those objectives suitable for computer-based training (CBT) development. The analysis section describes how the objectives were categorized by performance level and how a media selection model was applied to the set of identified objectives. The results identify the objectives suitable for CBT development. Three courseware options are proposed. Each option lists a set of topics for CBT development and specifies the depth and breadth of the proposed training.

RN 86-66 Formal "Systems Languages" in Decision Support Systems for Military Commanders, Hawgood, J. June 1986. (AD A169 673) This research note discusses the similarities and differences between the conceptual requirements of decision support in civilian and military situations, and introduces the idea of formal systems languages which vary as one moves through any hierarchy. The approach of "soft system methodology" is extended by the addition of the concept of mutually malevolent (mumal) systems. It is proposed that decision support systems for military commanders should be "taught" by means of the system language appropriate to the destined user.

RN 86-67 Controlling the Temporal Structure of Limb Movements: A Response, Schmidt, R.A. May 1986. (AD A169 261) This report is a response to a recent article by Berkinblit, et.al., which suggested that motor-program models, in which a centrally programmed temporal structure was a key ingredient, seemed incorrect. In particular, Schmidt takes issue with their discussion of Feldman's (1974) mass-spring model which denies a central program for limb movement timing and amplitudes. Schmidt argues that evidence for unidirectional actions and sequential movements limits the utility of the mass-spring model.

RN 86-68 Development of Interactive Videodisc Training for Army Land Navigation Skills, Elder, B.L.; Harris, C.D.; Sticha, P.J.; Stein, D.J.; Knerr, C.M.; Tkacz, S. May 1986. (AD A169 978) Congress, the Department of Defense and the Armed Services are emphasizing the application of advanced technology to solving military training problems, and

to improving training effectiveness. The tank commander (TC) of the Army's new M1 Abrams Tank is a prime target for the application of this advanced technology; within the repertoire of TC skills, the Army identified land navigation as the first training segment topic. The objective of this project was to develop and implement computer-based, interactive videodisc training in land navigation for the M1 Abrams tank commander. Since 1980, HumRRO has conducted a project to develop and evaluate applications of advanced multimedia technology for Army education. The most promising, selected for the majority of the instructional delivery, was a low-cost, microcomputer-controlled, interactive videodisc system. The emphasis of the instructional content was basic skills, with modules that trained spatial orientation and navigational skills, study and test-taking skills, problem solving, and other learning strategies. The spatial orientation and navigational material, one of the most successful modules, was ideally matched with the vicarious travel capabilities of the interactive videodisc system. Thus, the approach when dealing with this task was to refine the interactive video-disc instruction in land navigation to meet the needs of the tank commander. This report describes the development and implementation of computer-based, interactive videodisc training in land navigation for students in the M1 Abrams Tank Basic Non-Commissioned Officer Course (BNCOC)—19K. The products of this project are a two-sided videodisc; side one titled "NCO Land Navigation Skills" and side two titled "Map Reading Skills", as well as the related instructional software necessary to teach the following tasks:

Identify Terrain Features and Determine Elevation

Orient a Map by Terrain Association

Determine a Location on the Ground by Terrain Association

Locate a Point by Intersection or Resection

Analyze Terrain Using the Five Military Aspects of Terrain.

RN 86-69 Review of Non-Resident Language Training for Linguists in the U.S. Army, Anderson, C.L. June 1986. (AD A170 894) This report reviews the status of language proficiency for Army linguists in field environments. It concludes that the Army needs: a centralized refresher program, involvement of the Training and Doctrine Command in promotion of language awareness among Army personnel, updated curricula, refresher training programs at initial training sites, an incentive award system, monitoring of language proficiency in tactical settings, and ongoing assessment efforts.

RN 86-70 Final Report for a Prototype National Training Center Research Data Base System, Science Applications June 1986. (AD A172 606) The research described in this report was to develop the software necessary to set up a prototype research data base for retrieving information on past exercises at the National Training Center. The National Training Center was set up to provide realistic unit training for armor and mechanized infantry battalion task forces. A byproduct of this training is the exercise history data base, the only archive of fully-instrumented, battalion level, force-on-force combat interplay. To retrieve this data two software components were developed: 1) a Translator program, which accesses the NTC data base, processes the data, and creates readable files, and 2) a Loader program, which takes the output of the Translator program, and uses it to fill data tables.

RN 86-71 Computer-Managed Instruction for Tank Commanders: 19K BNCOC Computer-Based Management System Description and Documentation, Walker, B.L.; Russo, R.P.; Kupper, L.; Walton, D.; Kirchner, R. June 1986. (AD A170 949) The project called "Computer-Managed Instruction for Tank Commanders" was set up to help improve armor school training. It involved the design and development of a computer-based instruction (CBI) system for the M1 Tank Commander Course (19K BNCOC). The CBI system includes both computer-assisted instruction (CAI) and Computer Managed Instruction (CMI) for the 19K BNCOC course. This report provides a detailed description of the design of the CMI system developed by InterAmerica Research Associates. In addition, the report outlines the results of an assessment completed to identify the instructional and administrative needs of the 19K BNCOC course. Finally, complete documentation on the use of the CMI system is given in two related manuals included with the report: 1) "The 19K BNCOC Tutorial and Reference Manual" contains material for conducting training workshops and details how BNCOC instructors should make use of the system, 2) "The 19K BNCOC MicroTICCIT Site Manager and Operator's Manual" includes the technical documentation needed by a MicroTICCIT Operator/Site Manager to implement the CMI system.

RN 86-72 Computer-Managed Instruction for Tank Commanders: 19K BNCOC MicroTICCIT Tutorial and Reference Manual for Instructors, Walker, B.L.; Kirchner, R.; Kupper, L.; Walton, D. June 1986. (AD A171 071) The project called "Computer-Managed Instruction for Tank Commanders" was set up to help improve armor school training. It involved designing and developing a computer-based instruction (CBI) system for the M1 Tank Commander Course (19K BNCOC). This CBI system includes as part of the whole a computer-managed instruction (CMI) system related to the administration and management of the 19 BNCOC course, and a computer-assisted instruction (CAI) system which provides task-specific remedial training for students entering the course. This report contains the manual used as a reference tool by BNCOC instructors who use the CMI system. The manual contains training materials and a suggested workshop agenda which can be used to provide an introduction and overview of MicroTICCIT and the CMI system.

RN 86-73 Computer-Managed Instruction for Tank Commanders: 19K BNCOC MicroTICCIT Site Manager and Operator's Manual, Walker, B.L.; Kupper, L.; Walton, D.; Kirchner, R. June 1986. (AD A170 878) The Fort Knox Training Technology Field Activity (TTFA) was established to explore training technologies, and their application to the Army's training programs. The specific focus of the Ft. Knox TTFA is the improvement of the effectiveness and efficiency of training provided through the Basic Noncommissioned Officer's Course (BNCOC) for training M1 tank commanders (MOS 19K). One of the major activities undertaken by the Fort Knox TTFA is the development of a computer-based instruction system for 19K BNCOC. The system includes a computer-managed instruction (CMI) system that relates to the administration and management of the 19K BNCOC course, and computer-assisted instruction (CAI) which provides task-specific remedial training necessary for students entering the 19K BNCOC operators who manage the CMI system and the CAI components. All of the instructions and documentation in this manual assume that the user has a MicroTICCIT System II with TICCIT version 38.17 installed.

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RN 86-74 Symbology Sourcebook for Military Applications, Knapp, B.G. April 1986. (AD A172 035) The purpose of this document is to provide an up-to-date reference of all available military symbols currently being used. This listing is preceded by a summary of recent ARI research efforts in the area of the design and use of military symbology. The research efforts proceeded in three stages. The first stage required the collection and organization of many currently used military symbols to allow comparisons and identify conflicts. This catalog included the Army Field Manual 21-30 and was the basis for a comprehensive database of military symbols, known as TACSYM. TACSYM and several other sources (not compiled by ARI) are listed in this document. The second research stage was a survey of user's symbology needs. It revealed two major issues: (1) symbols did not exist for many concepts, and (2) therefore, users developed their own personalized illustrations for the concepts, resulting in a myriad of symbols representing the same concept. The third research stage was to experimentally investigate how to best develop and portray military symbols. Symbol characteristics such as perceptual discriminability, associative value, and configuration have been found to affect symbol detection. A systematic technique for choosing among alternative symbols was developed and procedures for designing new ones are presently being investigated.

RN 86-75 Meaning and Function of Military Experience, Fiedler, F.E. July 1986. (AD A171 092) A recently-proposed "cognitive resource" theory of leadership effectiveness explains the role of cognitive resources such as intellectual abilities, technical competence, and job-relevant knowledge (experience) in determining group performance. This research note examines one aspect of the theory: the conditions under which the leader's intellectual abilities and experience contribute to performance on the part of the group. Empirical evidence suggests that leaders' intellectual abilities contribute to performance when leaders play a directive role in relatively stress-free conditions, and when their abilities match the requirements of the task. Under stress, however, leaders fall back on previously-learned skills and behaviors i.e., on experience gained in the course of time in the organization.

RN 86-76 The Training Information Management System: User's Manual for the Training Base Station, Perceptronics, Inc. July 1986. (AD A172 098) The Training Information Management System (TIMS) is a computer-based system which can be used by Army personnel to collect and display training evaluation data during field training exercises, and to generate summary evaluation reports following the exercises. The TIMS has two major subsystems: the Electronic Clipboard System (ECS), and the Training Base Station (TBS). The ECS is a hand-held electronic field training and performance evaluation aid, which contains and displays performance evaluation checklists and other associated information to allow a training evaluator to record the success or failure of a soldier in meeting the standards of performance for selected tasks. The TBS is a computer-based subsystem that maintains multiple checklist databases, transfers data to and from the ECS, and generates printed and displayed summaries of training performance. It is not field-portable, but resides at a fixed location (e.g., the unit headquarters). This research note presents information on, and instructions for using, the TBS. The complete list of reports, of which this is Vol. 4, is as follows:
RN 86-85 The Training Information Management System: Phase II Final Report. Technical and Management Overview
RN 86-78 The Training Information Management System: Phase II Evaluation Report
RN 86-79 The Training Information Management System: Phase II Functional Specifications

RN 86-76 The Training Information Management System: User's Manual for the Training Base Station

RN 86-81 The Training Information Management System: Software Design Documentation for the Training Base Station

RN 86-77 The Training Information Management System: User's Manual for the Electronic Clipboard System

RN 86-82 The Training Information Management System: Software/Firmware Design Documentation for the Electronic Clipboard System.

RN 86-77 The Training Information Management System: User's Manual for the Electronic Clipboard System, Perceptronics, Inc. July 1986. (AD A172 217) The Training Information Management System (TIMS) is a computer-based system which can be used by Army personnel to collect and display training evaluation data during field training exercises, and to generate summary evaluation reports following the exercises. The TIMS has two major subsystems: the Electronic Clipboard System (ECS), and the Training Base Station (TBS). The ECS is a hand-held electronic field training and performance evaluation aid, which contains and displays performance evaluation checklists and other associated information to allow a training evaluator to record the success or failure of a soldier in meeting the standards of performance for selected tasks. The TBS is a computer-based subsystem that maintains multiple checklist databases, transfers data to and from the ECS, and generates printed and displayed summaries of training performance. It is not field-portable, but resides at a fixed location (e.g., the unit headquarters). This research note provides information on, and instructions for using, the Electronic Clipboard System. The complete list of reports, of which this is volume 6, is as follows:

RN 86-85 The Training Information Management System: Phase II Final Report. Technical and Management Overview

RN 86-78 The Training Information Management System: Phase II Evaluation Report

RN 86-79 The Training Information Management System: Phase II Functional Specifications

RN 86-76 The Training Information Management System: User's Manual for the Training Base Station

RN 86-81 The Training Information Management System: Software Design Documentation for the Training Base Station

RN 86-77 The Training Information Management System: User's Manual for the Electronic Clipboard System

RN 86-82 The Training Information Management System: Software/Firmware Design Documentation for the Electronic Clipboard System.

RN 86-78 The Training Information Management System: Phase II Evaluation Report, Perceptronics, Inc. July 1986. (AD A172 218) The Training Information Management System (TIMS) is a computer-based system which can be used by Army personnel to collect and display training evaluation data during field training exercises, and to generate summary evaluation reports following the exercises. The TIMS has two major subsystems: the Electronic Clipboard System (ECS), and the Training Base Station (TBS). The ECS is a hand-held electronic field training and performance evaluation aid, which contains and displays performance evaluation checklists and other associated information to allow a training evaluator to record the success or failure of a soldier in meeting the standards of

performance for selected tasks. The TBS is a computer-based subsystem that maintains multiple checklist databases, transfers data to and from the ECS, and generates printed and displayed summaries of training performance. It is not field-portable, but resides at a fixed location (e.g., the unit headquarters). This research note documents an evaluation of the Training Information Management System. The complete list of reports, of which this is volume 2, is as follows:

RN 86-85 The Training Information Management System: Phase II Final Report. Technical and Management Overview

RN 86-78 The Training Information Management System: Phase II Evaluation Report

RN 86-79 The Training Information Management System: Phase II Functional Specifications

RN 86-76 The Training Information Management System: User's Manual for the Training Base Station

RN 86-81 The Training Information Management System: Software Design Documentation for the Training Base Station

RN 86-77 The Training Information Management System: User's Manual for the Electronic Clipboard System

RN 86-82 The Training Information Management System: Software/Firmware Design Documentation for the Electronic Clipboard System.

RN 86-79 The Training Information Management System: Phase II Functional Specifications, Perceptronics, Inc. July 1986. (AD A172 097) The Training Information Management System (TIMS) is a computer-based system which can be used by Army personnel to collect and display training evaluation data during field training exercises, and to generate summary evaluation reports following the exercises. The TIMS has two major subsystems: the Electronic Clipboard System (ECS), and the Training Base Station (TBS). The ECS is a hand-held electronic field training and performance evaluation aid, which contains and displays performance evaluation checklists and other associated information to allow a training evaluator to record the success or failure of a soldier in meeting the standards of performance for selected tasks. The TBS is a computer-based subsystem that maintains multiple checklist databases, transfers data to and from the ECS, and generates printed and displayed summaries of training performance. It is not field-portable, but resides at a fixed location (e.g., the unit headquarters). This report documents the Training Information Management System's functional specifications. The complete list of reports, of which this is volume 3, is as follows:

RN 86-85 The Training Information Management System: Phase II Final Report. Technical and Management Overview

RN 86-78 The Training Information Management System: Phase II Evaluation Report

RN 86-79 The Training Information Management System: Phase II Functional Specifications

RN 86-76 The Training Information Management System: User's Manual for the Training Base Station

RN 86-81 The Training Information Management System: Software Design Documentation for the Training Base Station

RN 86-77 The Training Information Management System: User's Manual for the Electronic Clipboard System

RN 86-82 The Training Information Management System: Software/Firmware Design Documentation for the Electronic Clipboard System.

RN 86-80 to 86-82 Canceled.

RN 86-83 Formative Evaluation of a Sociotechnical System Intervention at an Army Maintenance Depot, Van Rijn, P. (ed.). July 1986. (AD A170 948) This research note describes in detail the sociotechnical intervention that was conducted at the Corpus Christi Army Depot from 1982 through 1984. The note consists of a series of seven formative evaluations describing and analyzing the organizational change process as it unfolded at the Depot. The development of an archival and survey measurement system to help assess the impact of the intervention on the productivity and quality of working life at the Depot is also included in the report.

RN 86-84 Attitudes Toward the New Manning System (NMS) and NMS System Characteristics, Tremble, T.R., Jr.; Brosvic, G.M.; Mangiardi, A.R. July 1986. (AD A171 420) The personnel management system called the New Manning System (NMS) was set up by the Army to increase personnel stability both within units, and in the careers of individual soldiers. Soldiers in this test system and in the conventional Army personnel system were surveyed on their attitudes toward the "COHORT" system, under which units remain intact for a certain period of time. The "COHORT" system is one of the principal components of the NMS. The results of the survey are summarized and examined in this report. The results may provide guidance in developing programs to promote user acceptance of the NMS.

RN 86-85 The Training Information Management System: Phase II Final Report Technical and Management Overview, Perceptronics, Inc. July 1986. (AD A172 099) The Training Information Management System (TIMS) is a computer-based system and can be used by Army personnel to collect and display training evaluation data during field training exercises, and to generate summary evaluation reports following the exercises. The TIMS has two major subsystems, the Electronic Clipboard System (ECS) and the Training Base Station (TBS). The ECS is a hand-held electronic field training and performance evaluation aid, which contains and displays performance evaluation checklists and other associated information to allow a training evaluator to record the success or failure of a soldier in meeting the standards of performance for selected tasks. The TBS is a computer-based subsystem that maintains multiple checklist databases, transfers data to and from the ECS, and generates printed and displayed summaries of training performance. It is not field-portable, but resides at a fixed location (e.g., the unit headquarters). This research note provides a technical and management overview of the development and evaluation of the Technical Management Information System. The complete list of reports, of which this is volume 1, is as follows:

RN 86-85 The Training Information Management System: Phase II Final Report. Technical and Management Overview

RN 86-78 The Training Information Management System: Phase II Evaluation Report

RN 86-79 The Training Information Management System: Phase II Functional Specifications

RN 86-76 The Training Information Management System: User's Manual for the Training Base Station

RN 86-81 The Training Information Management System: Software Design Documentation for the Training Base Station

RN 86-77 The Training Information Management System: User's Manual for the Electronic Clipboard System

RN 86-82 The Training Information Management System: Software/Firmware Design Documentation for the Electronic Clipboard System.

RN 86-86 Artificial Intelligence Through Evolutionary Programming: Prediction and Identification, Fogel, L.J.; Fogel, D. August 1986. (AD A171 544) This report examines the manner by which evolutionary programming treats an arbitrary prediction problem. Additional experiments were conducted to clarify uncertainties given increased machine size and the cost/benefit of retaining "offspring" programs, the impact of noise on the predictive capability of the evolutionary process, and the efficacy of crossover as a mechanism for improving simulated evolution. It was also found that some difficult combinatorial problems such as the classic Traveling Salesman Problem can be addressed through less complex logics.

RN 86-87 An Analysis of Costs of Computer Based Training Hardware and Courseware Development for the Model Training Program for Reserve Component Units, Begg, J.; Bernstein, K. August 1986. (AD A172 572) This report analyses the costs of producing and delivering MicroTICCIT computer-based training system courseware for the Model Training Program for Reserve Component Units (MTP-RC). Part One of the report analyses the costs of system configurations with various host computers, amounts of storage, and numbers of workstations. Costs are reported in the format: Total System Cost Per Student Hour In A Five-Year Lifecycle, and the most economical configuration is identified. Part Two reports the cost of developing five types of lessons, each based on MTP-RC instructional templates. Costs are reported in four labor categories for each type of lesson. Variations in cost between types are discussed and three variables which can effect cost are identified.

RN 86-88 A Study of Organizational Information Search, Acquisition, Storage, and Retrieval, Huber, G.P. (ed.). August 1986. (AD A172 063) The final report is a compendium of what is and what is not known about organizational processes. Section 1 of the report is a review of what is known and what is not known about the information-based representation of the actual environment faced and created by organizations. Section 2 is a review of what is and what is not known about organizational learning. Much can be gleaned from the system-structural approach, but less is available on the interpretive perspective. One major thrust suggests that the two approaches can be usefully linked with a communication framework. Section 3 introduces the idea that the domains of existing organizational design paradigms are declining in scope, and that the nature of current and future organizational environments requires use of a design paradigm that responds to the increasing frequency and criticality of the decision making process. Section 4 introduces the idea that the limitations of available information distribution technologies constrain the designs of organizations. When new technology with fewer limitations arrives, it ought to be exploited by creating more effective organizations. Section 5 is a critical review of the literature on the systems paradigm and its relationship to the development or organizational theory. Mistaken beliefs have repeatedly appeared concerning this topic and many opportunities remain unexplored. Section 6 describes both research and conceptual needs in the area of organizational design.

RN 86-89 Novice Rules for Assessing Importance in Scientific Texts, Dee-Lucas, D.;
Larkin, J.H. August 1986. (AD A171 551) Scientific texts are typically densely packed with complex content, making it particularly difficult for novice learners to identify important information. The current study found that novice readers judge importance on the basis of "form" (i.e., definition or fact) in which information is presented. In this study, expert and novice physicists judged the importance of sentences in physics texts when they were presented as definitions or facts. The definitions and facts were identical in content differing only in minor wording changes. Sentence form influenced the importance judgments of novices, but not those of experts. Novices judged sentences that were identical in content as more important when they were presented as definitions. These results indicate that textbook writers need to be aware of how form influences novices' perception of what is important in order to effectively guide attention to critical text content. Techniques for altering readers' attention (i.e., signaling and strategy instruction) are discussed.

**RN 86-90 Data Collection Via a Quasi-Experimental Simulation Technology: III.
Factor Structure and Validity**, Streufert, S.; Pogash, R.M.; Piasecki, M.T.;
Repman, M.A.; Swezey, R.W. October 1986. (AD A173 913) The number of measures that are collected from participants in the quasi-experimental simulation technology have continued to increase as the technology has continued to be developed. With as many as 60 separate measures now available, it has become important to determine where commonalities among the measures might exist. The present report explores those commonalities via a factor analysis of scores obtained by more than 100 lower level managers who participated in the simulations. In an evaluation of assessment validity, the present report correlates performance scores and factor scores with sociographic indicators of success (age relevant income and job level, etc.) and, finally, employs multiple stepwise regression procedures to select both the theoretical concepts and the simulation based measures that are optimal predictors of managerial achievement. To date, these predictors include: adequate attention to problems/emergencies; time length of planning; delay between information receipt and response; simplistic actions; breadth of approach to complex task demands; applications of basic strategy; quality of strategy; and the capacity to shift from a strategic to a problem oriented approach as needed, together with the capacity to return to strategic thinking when emergencies are resolved or problems are diminished.

**RN 86-91 Analysis of Content and Organization of the Bradley Fighting Vehicle
Commanders Course**, Perkins, M.S.; Rollier, R.L. October 1986. (AD A174 399)
This research note reports the results of detailed analysis of the Bradley Commanders Course, conducted at the U.S. Army Infantry School. The analysis supports the conclusion that the overall quality of the course is high, considering its scope, and the relatively short period since its inception. There are areas, however, where constructive interventions could have high payoff potential. These fall, generally, into the categories of changes or augmentations of course content, course administration, and student evaluation practices. To be specific, the research note recommends that the overall quality of instruction received by the students being trained as Bradley commanders be improved. The maximum class size should be 30 students. The live fire annex of the Program of Instruction (POI) should be revised to reflect accurate descriptions of both the live fire and concurrent training objectives. A Bradley Infantry Fighting Vehicle (BIFV) tactics test (with a passing grade required for graduation) should be administered, and

the tactics portion of the instruction should be augmented by use of guest speakers who are knowledgeable about critical BIFV operational issues. Finally, certain blocks of instructional content (particularly in the areas of tactics and gunnery) that could be added to the course without increasing course length were identified.

RN 86-92 Development and Psychometric Testing of the Strategy Inventory for Language Learning (SILL): Appendix, Oxford, R.L. November 1986. (AD A175 452) As part of a Language Skill Change Project (a longitudinal research effort to determine the status of language skills of Army Linguists after their formal language training is over) the work described in this report concerns development of a valid and reliable instrument to measure the frequency of various second-language-learning strategies. Findings indicate that key factors in long-term retention are study skills, functional practice, searching for and communicating meaning, formal practice, mnemonics, and fear of using the second language.

RN 86-93 Canceled.

RN 86-94 Human Factors Research in Aircrew Performance and Training: Final Summary Report, Cross, K.D.; Szabo, S.M. November 1986. (AD A175 348) This report presents a summary of the work performed by Anacapa Sciences, Inc. (ASI) for ARIARDA at Fort Rucker, Alabama, under Contract No. MDA903-81-C-0504, "Human Factors Research in Aircrew Performance and Training." The report contains summary descriptions for each of 29 projects on which ASI personnel worked during the period 1 September 1981 to 31 December 1985. Each summary description contains (a) a background section that describes the rationale for the research and the research objectives, (b) a research approach section that describes the tasks and activities required to fulfill the project objectives, (c) a results section that describes the research findings, and (d) a project status section that describes the work completed and projections for future research, if any.

RN 86-95 Psychological Analyses of Courageous Performance in Military Personnel, Rachman, S.; McMillan, T. November 1986. (AD A176 275) Four studies were carried out to examine several aspects of courageous military performance. Paratroop veterans showed the low responsiveness under stress that is characteristic of "fearless" bomb-disposal operators. A long-term prospective study of new and experienced bomb-disposal operators is underway. Recruits to parachute training were found to perform successfully, and 3 patterns of behavior were identified by cluster analysis: courageous performance (66% of sample of 105), fearless performance (26%), and overconfident performance (7%). A predictive study of parachute training is underway.

RN 86-96 Information Storage and Access in Decisionmaking Organizations, Bejjani, G.J.; Levis, A.H.; Stanley, M. November 1986. (AD A176 173) Information storage and access in decisionmaking organizations is modelled using a Petri Net representation. A centralized and a decentralized database configuration are analyzed, and their impacts on the decisonmaker's workload are assessed. Organizational protocols are defined, and their criteria of acceptability presented. Protocols' key variables, minimum allowable input inter-arrival time, and response time are determined for two organizational structures parallel and hierarchical. A numerical example suggests the use of timeliness as a third organizational

attribute the first two being workload and performance. It also demonstrates the importance of updating coordination in evaluating the organization's performance.

RN 86-97 Human Factors Research in Aircrew Performance and Training: Annual Summary Report, Cross, K.D. November 1986. (AD A176 099) This report presents a summary of the work performed by Anacapa Sciences, Inc. (ASI) for the Army Research Institute (ARI) Field Unit at Fort Rucker Alabama, under the contract "Human Factors Research in Aircrew Performance and Training". This research note contains summary descriptions of each of the projects on which ASI personnel worked during the third contract year September 1983 to August 1984. Each summary description contains: a background section that describes the rationale for the research and the research objectives; a research approach section that describes the tasks and activities required to fulfill the project objectives; and a project status section that describes the work completed, the preliminary findings (if available), and the anticipated project completion date.

RN 86-98 Novice Rules for Assessing Importance in Scientific Texts, Dee-Lucas, D.; Larkin, J.H. December 1986. (AD A177 676) This study complements research indicating that content-area novices judge the importance of what they read in texts on the basis of sentence type (e.g., whether sentences are definitions or statements). Subjects varying in expertise judged the importance of sentences in physics texts which were presented as definitions or as statements of fact. Definitions and statements were identical in substantive content. Those in the categories of expert and novice judged the variants as equal in importance. Beginning physics students, however, judged the definitions as more important. These results suggest that sentence form is a salient text feature for beginning-level students. Beginners lack the knowledge necessary to judge the importance of content directly, but they have developed general rules about what types of information are often important in physics. By contrast, sentence form is not relevant for people with no training in physics they have no expectations at all regarding what types of information should be important; and experts pay little attention to sentence form because they have rich content schemes which enable them to judge importance directly. These results have theoretical implications for understanding content schema development and also have practical implications for the writing of textbooks.

RN 86-99 HAWK MACH–III Intelligent Maintenance Tutor Design Development Report, Massey, D.; Kurland, L.; Tenney, Y.; De Bruin, J.; Quayle, K.C. December 1986. (AD A178 448) This Research Note presents the design and development of the HAWK MACH-III demonstrator. The MACH-III system will be an intelligent tutoring system centering on instruction in the diagnosis and correction of faults at the level of organizational maintenance in the AN/MPQ-57 High-Powered Illuminator Radar (RAM/HIPIR) component of the HAWK air defense system. Formative and summative evaluation of the system and courseware will be conducted within the program of instruction for HAWK Firing Section Mechanics (MOS 24C) conducted at the U.S. Army Air Defense Artillery School (USAADASCH), Fort Bliss, Texas.

RN 86-100 Training for Retrieval of Knowledge Under Stress Through Algorithmic Decomposition, Zakay, D.; Kessel, C.; Bekhor, L. December 1986. (AD A178 756) The present study deals with problems of estimation; specifically, the kind performed by

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military officers under conditions of uncertainty and stress. Two types of estimation were examined in this Research Note: the estimation of factual quantities, and the revision of probability in base-rate type problems. Two corrective procedures were also tested: algorithmic decomposition, in which the target estimate is divided into simple and known sub-estimates, which are then combined according to rule, in order to yield the target estimate; and tutorial instruction in a technique called Training by Mental Imaging (TbMI). Results of the testing were that the algorithmic decomposition approach is inadequate for a non-academic military population, since it imposes high mental load, and diverts attention to the creation of the algorithm. The TbMI approach was found to be efficient in training and improving performance, and prompted generalization as well. Thus, it is recommended that the use of mental imaging be further developed, and expanded for use in a computer-aided instruction (CAI) plan.

RN 86-101 The Design and Development of An Intelligent Planning Aid, Andriole, S. July 1986. (AD A178 332) This research note discusses progress in developing an intelligent tactical planning aid. It documents the development of a decision-making, planning, and decision-aiding analytical framework comprising a set of models, a generic task/behavior taxonomy, and an inventory of decision-aiding methods. Six U.S. Army officers participated in two videotaped experiments designed to capture the essence of tactical military planning. Results suggested that tactical planning at the Corps level was goal-oriented and hierarchical, that tactical planning tasks were essentially mediational in nature, and that the "best" methods available to satisfy the requirements could be found in multi-attribute utility assessment, artificial intelligence, and interactive graphic display techniques. The TACPLAN aid assists tactical military planners at the Corps level by developing new defensive plans via the use of an intelligent tactical planning template which will elicit judgments from the planner, link the judgments to knowledge bases related to the planning process and the problem at hand, and permit the planner to draw his candidate plans through an interactive video disc-based graphic interface. Phase Two research goals include the development of these environmental and challenger capabilities, the development of additional template dimensions, the testing of an evaluation at the Army War College, and documentation.

RN 86-102 Analogical Decision Making, Klein, G.A. December 1986. (AD A178 836) The overall goal of the research program this research note describes is to develop a descriptive model of decision making, a model which can be applied to tactical and strategic decision-making domains. Variables such as time pressure, risk, and levels of expertise, will be explored to see how they affect the use of decision strategies and situational assessment. Analytical and recognitional models of decision making will also be contrasted. The results obtained so far suggest the general applicability of the recognition-primed decision (RPD) model. Even less experienced decision makers don't rely on analytic decision strategies where time pressure is not great, and where group dynamics are operating. Decision makers generally judge a situation to be of a familiar type, generate the most typical reaction, evaluate that reaction, and then put it into effect without further evaluation if it is plausible. Only if it is not plausible, is an attempt made to modify it, and it must be judged implausible for the next most typical action to be generated. Situation assessment appears to be the most critical stage of naturalistic decision making, and differences in situation assessment appear to account for the primary differences in the quality of decisions made.

RN 86-103 An Economic Analysis of Army Enlistment Supply, Horne, D.K. February 1985. (AD A176 201) This research note addresses methodological problems involved with modelling enlistment behavior, and develops an econometric forecasting model. Previous time-series forecasting models have been subject to a variety of problems including incomplete specification of lag structures, and model misspecification. These problems are discussed and corrected in this model. Unemployment, military compensation, and recruiters all appear to influence enlistment rates, and are incorporated into a model used to generate enlistment forecasts through 1990. The results indicate that the economic recovery and the declining youth population have already led to a fall in the number of high-quality male recruits, and the shortfall is expected to become worse over time. If military compensation and recruiting resources are held constant, and the economy continues to improve, the number of GSM 1-3A recruits may fall short of goals by 40 percent or more by 1990. However, the model also demonstrates that timely recruiting policies may countervail these negative influences.

RN 87-01 Decreasing Damaging Effects of Stress-Bound Situations: Towards a New Model of Leadership Under Stress, Pereira, O.; Jesuino, J. January 1987. (AD A178 379) In jobs or tasks where no possibility exists to avoid stress (e.g., combat action) repeated exposure is likely to produce relatively permanent damage in groups or individuals. Previous research by Pereira (1964-1981) demonstrated this fact in the case of marines involved in counter-guerrilla activity. Pereira and Jesuino (1982), using Fiedler's model as a framework, have shown that appropriate leadership can buffer the consequences of stress. To understand how such an effect comes about, the authors developed and began testing on a model of leadership-group transactions. The results of this field study show that leadership has a significant bearing on the stressors-strain interface. Bureaucratic expertise is a prerequisite for leader and subordinates' acceptance of one another. Continuation of the research, and some practical applications of the finding are discussed.

RN 87-02 Psychological Approaches to Organized Aggression, Rachman, S.J. January 1987. (AD A181 150) Psychological aspects of terrorism are divided into 6 categories: a) psychological analyses of terrorists, b) the nature, timing and effects of terrorist acts, c) the behavior during acts of terrorism of terrorists, victims and negotiators, d) the prediction and prevention of acts of terrorism, e) the effects of such acts on victims, and f) psychological assistance for victims. Psychologists are already making a small but useful contribution to assessing the effects of terrorist acts on victims and have started to develop useful guidelines for assisting such victims to recover from the effects of such acts. Little has been added to our knowledge or understanding of terrorists or of groups of terrorists. Also, the psychology of negotiators and negotiations has yet to be analyzed in a psychological framework. The possibility of making predictions about acts of terrorism on the basis of psychological data has not been considered. Acts of political terror should be separated from non-political acts of criminal violence. The search for psychological profiles that will discriminate between terrorists and non-terrorists will be fruitless. Practical obstacles to conducting psychological research into terrorism are also considered.

RN 87-03 A Research Review on Psychological Aspects of Extreme Behavior, Taylor, M. January 1987. (AD A179 860) This paper comprises three broad sections. The first discusses and reviews psychological approaches to the identification and definition of

terrorism, including its consequences, violence associated with it, the relationship between terrorism and mental health, and the notion of state and non-state terrorism. Different types of terrorism are identified, and a list of the elements which may constitute the boundaries of terrorism are presented. The second section of the report reviews the psychological literature on terrorism, examining the concept of terrorist motivation, the psychological profiling of terrorists, and psychological accounts of the process of terrorism, to include the concept of identification, and the influence of the group. The third section introduces and develops a behavioral approach to the analysis of terrorism, and indicates avenues for future research.

RN 87-04 Addressing the Traveling Salesman Problem Through Evolutionary Adaptation, Fogel, D.B. January 1987. (AD A179 992) Optimizing the "travelling salesman" problem continues to receive attention for three reasons: its solution is computationally difficult, although the algorithm itself is easily expressed; it is broadly applicable to a variety of engineering problems; and it has become somewhat of a comparison "benchmark" problem. The task contained in the problem is to arrange a tour of n cities in such a way that each city is visited only once, and the length of the tour (or some other cost function) is minimized. For an exact solution, the only known algorithms require the number of steps to grow at least exponentially with the number of elements in the problem. Brute force methods of finding the shortest path require the compilation of a list of (n-1)l/2 alternative tours, a number which grows faster than any finite power of n, so the task quickly becomes unmanageable.

RN 87-05 The Effect of Guided Imagery and Internal Visualization on Learning, Caskey, O.; Meier, D. January 1987. (AD A179 854) This study examined the effects of mental imagery on short-term and long-term retention of learning material. Subjects presented with learning material through mental imagery achieved significantly higher gain scores on tests of immediate and long-term recall compared to control subjects who studied material from a traditional, lecture-based method. No significant differences were found between experimental and control groups in terms of class, major, grade point average, ethnicity, brain lateralization characteristics or cognitive learning style preferences. The imagery group registered more positive attitudes toward the learning experience and the teaching method used than did their counterparts in the non-imagery group.

RN 87-06 National Training Center Research Issues, Ritenour, T.J. January 1987. (AD A178 936) The National Training Center (NTC) provides realistic training conditions for heavy battalion task forces. In addition to this primary mission, however, NTC also serves a research purpose. For this reason, the Army Research Institute (ARI) has undertaken a research program in support of the Combined Arms Training Activity, NTC's parent organization. The program supports the Training Activity's mission of developing lessons learned from past experience. The present research note presents a framework for issue identification which is specifically tailored to the needs of the NTC, i.e., the issues identified are able to be researched at the NTC. The utility of this framework is three fold: it demonstrates and organizes the wide range of issues suitable for investigation at the NTC, it provides input on selection of issues and setting of priorities which can be of use to policy makers, it permits the formulation and categorization of new issues.

RN 87-07 National Training Center Data Library, Kemper, T.; Briscoe, J.A. January 1987. (AD A178 947) The primary objective of this report is to assess the materials present at the Army Research Institute's field unit at Presidio of Monterey, and to determine security procedures and current data processing routines. The second objective is to determine what materials are necessary for current and anticipated research efforts.

RN 87-08 Capability To Analyze National Training Center Data, Briscoe, J.A. January 1987. (AD A178 948) This report examines the ability (as of October, 1985) of the ARI Field Unit at Presidio of Monterey to use digital data from the National Training Center (NTC) in order to fulfill its mission: research into the training implications of NTC performance. The report is divided into six sections: 1) a description of the types of digital data available from the NTC, 2) a description of the relevant software capacities of the Field Unit, 3) a resume of the capabilities of the software tools available at the inception of the current research effort (1 March 1985), 4) a summary of the activities undertaken to improve the Field Unit's ability to use NTC data, 5) a report on the current status of the Field Unit's ability to use NTC data to fulfill its objectives, 6) a brief discussion of short and long range plans to expand the Field Unit's capabilities. The report focuses on the use of *digital* data, as opposed to other types of NTC products which may contribute to meaningful research.

RN 87-09 Program GDETAP Documentation, Briscoe, J.A. January 1987. (AD A179 892) GDETAP is a VAX Fortran program which can read the GDE log tape produced at the National Training Center (NTC), and produce reports and files on the data the tape contains. There are two separate sources of digital data at NTC, the GDE tape, and BACKUP tapes created from files set up using the CIS VAX-780 computer. Comparing the position/location data from the GDE tapes with the files created from the BACKUP tapes will be useful for several reasons:

> a) validation of the NTC research database system
>
> b) access to data not available currently
>
> c) the possibility of combining data sources to clean data.

In order to access data on the log tapes, it was necessary to develop a VAX program to read them. This has been done, and documentation of the tape-reading program GDETAP is the subject of this report.

RN 87-10 A Method of Analysis for the Bradley Fighting Vehicle System, Shackelford, W.L. January 1987. (AD A179 968) The Bradley Fighting Vehicle System (BFVS) is part of the U.S. Army's force modernization effort aimed at improving the overall posture of the force. This vehicle has recently come under considerable scrutiny regarding its cost effectiveness. Specifically, there is concern whether the BFVS is performing its originally intended function as a force multiplier. One source of information that bears on this issue is the performance of the BFVS under realistic combat conditions at the NTC. The NTC provides as close to combat conditions as currently available and battalion task forces are now routinely rotating to the NTC equipped with the BFVS. The Army Research Institute, in support of the Combined Arms Training Activity's mission at the NTC, prepared a detailed method of analysis to investigate the BFVS at the NTC. The resultant method of analysis is a comprehensive plan for addressing the issue of the performance of the BFVS at the NTC.

RN 87-11   Research Plan for the Evaluation of the Requirements for the Effective Integration of the National Training Center and Home Station Training, Kerins, J.W.; Forsythe, T.K.; Avant, T.L. January 1987. (AD A179 893) The research note presents a Test Concept for investigating the effective integration of unit home station and National Training Center (NTC) training. At present, there is no Army-wide method to prepare for, and benefit from, NTC training. Since the training experience is an important part of a unit's overall training program, the Army must derive the greatest increase in readiness from this training that is possible. The Test Concept examined here consists of comprehensive data collection on a unit's training program before and after it has been to the NTC. This permits a determination of activities related to NTC performance, as well as permitting methods to be specified for incorporating these activities into Home Station training. The final goal is a set of guidelines for effectively integrating Unit Home Station training and NTC training.

RN 87-12   Comparison of National Training Center Data Sources, Briscoe, J. January 1987. (AD A179 797) This research note has a twofold purpose: to provide an introduction to the National Training Center's (NTC's) Range Data Management Subsystem log data, and to compare the two NTC digital data sources, 1) Core Instrumentation Subsystem log tapes and 2) RDMS log tapes. Section One describes the data sources and the types of data that may be expected from each, Section Two documents the methodology used in the mission segments selected, Section Three presents the results of the analysis, and Section Four presents the conclusions.

RN 87-13   Documentation for "What Now, Captain?": A Training Concept for Exporting Lessons Learned From the National Training Center, Avant, T.L.; Henderson, R.S. January 1987. (AD A179 991) The National Training Center (NTC) provides a realistic training environment for battalion training forces. Part of NTC's training concept is the collection and use of a wide range of training information: audio, video and digital. These provide an unparalleled opportunity to examine and send back to the units, and to the larger Army community, performance information. At present, effective and comprehensive utilization of this information has not been made. To remedy the shortfall in utilization, the Army Research Institute (ARI) has contracted with the BDM Corporation to perform a three-year study on the design and development of an NTC Home Station feedback system. One of the results of the first year of this effort was the development of the "What now, Captain?" training concept. This involves the utilization of all NTC data sources (audio, video, and digital) to prepare short video vignettes based on real NTC missions. The design of these vignettes will stress certain tactical mission fundamentals; the intent is to use the vignettes as part of the tactical instruction provided to the officers within a battalion. ARI RN 87-13 provides a detailed summary of this training concept, and of its proposed products.

RN 87-14   A Preliminary Analysis of National Training Center Force-on-Force Performance, Nichols, J.J. January 1987. (AD A180 287) This Research Note presents the conclusions of an exploratory analysis performed by the Army Research Institute (ARI). Using the data compiled from 64 "take home packages" completed by units which had been through battalion task force training at the National Training Center (NTC), the following findings were made:

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1) There was considerable variability in performance, both between battalions, and across missions.

2) Generally, the task forces suffered very high casualty rates themselves, while inflicting relatively low casualty rates on the opposing forces (OPFOR). This seemed to be the case for all task forces, and was seemingly unrelated to the MTOE (modification table of organization and equipment) of the task force. In order to understand task force performance, it will be necessary to have a full complement of data, rather than the partial complement available in the take home packages.

RN 87-15 National Training Center Lessons Learned: Data Requirements, Johnson, C.A. February 1987. (AD A181 097) The Army Research Institute and the Combined Arms Training Activity (CATA) held the first of a planned series of working group meetings to improve National Training Center (NTC) data on May 13 and 14, 1986. This research note summarizes the results of that meeting, and lists previously identified user needs as well. A comparison of user needs to the data currently collected shows that the data are insufficient to answer many important research questions, and the note concludes with recommendations for improving data collection techniques, quality, and types.

RN 87-16 Methodology Development for Deriving Lessons Learned From the National Training Center: Progress and Future Directions, Doherty, W.J. (ed.). February 1987. (AD A180 006) As part of a 3 year contract effort, in support of the Army Research Institute's (ARI's) research program at the National Training Center (NTC), a plan has been prepared that summarizes the first year's progress, and describes the activities for the second year. During the first year, 22 identifiable products or reports were prepared. These fell into four major areas of endeavor: measurement of unit performance, development of lessons learned, investigation of data quality, and creation of guides to the NTC instrumentation system. Year two efforts will continue and expand the progress achieved, in large part through the use of an integrating model of unit NTC performance developed during the first year. This should enhance ARI's support for the development and dissemination of lessons learned from the NTC.

RN 87-17 Target Acquisition and Analysis Training System: Comparison of Two Training Media Using the Basic Combat Vehicle Identification (CVI) Training Program, Nicholson, N.R.; Smith, N.D.; Heuckeroth, O.H. February 1987. (AD A181 032) The Basic Combat Vehicle Identification (CVI) Training Program (GTA 17-2-9) currently in use by the Army is an effective training program, which uses the Kodak Carousel 35 mm slide projector system, a system available to the lowest-echelon Army unit. The system has many disadvantages, however, and these motivated research to develop and test an alternative system using audio filmstrips. Soldiers were trained on both the filmstrip and the slide systems. The result was that soldiers identified significantly more combat vehicles after one training period with the filmstrip system than after one training period with the slide system. After a second training period, soldiers who received the filmstrip first and the slide system second showed no significant performance change, but the soldiers who saw the slide system first and then saw the filmstrip showed a significant improvement in performance. User evaluation by all ranks (E1 to E6) after training on each system resulted in the audio filmstrip being rated significantly higher than the slide system for ease of instructor use (e.g.

mobility, classroom set-up, and instructor preparation), and in terms of pupil satisfaction. Soldiers rated the filmstrip system higher than the slide system by a significant margin when stating which medium they would prefer for future training.

RN 87-18 Decision Making: An Annotated Bibliography of Selected Recent Literature, Decker, E.S.; Riedel, S.L. February 1987. (AD A181 147) This annotated bibliography of selected readings in decision making is designed to serve as a guide for researchers and military personnel by providing them with a current bibliography on decision making/aiding in man/computer systems.

RN 87-19 Predicting Salesperson Performance: A Review of the Literature, Kanfer, R.; Borman, W.C. February 1987. (AD A181 151) This report reviews the conceptual and empirical research related to the prediction of sales performance appearing in the literature from 1951-1985. The introductory section describes the steps taken to locate studies used in the review. The next section presents and evaluates two recent conceptual models of the determinants of sales behavior, performance, and effectiveness. A third model, emphasizing the distinction between sales behaviors, performance, and effectiveness is suggested. The third section reviews empirical research on the development and validity of criterion measures of sales success. Conceptual, methodological, and pragmatic difficulties associated with identification of appropriate criterion measures are discussed. The fourth section examines and evaluates empirical research addressing the predictive validity of biographical/personal history, personality/vocational interest variables, aptitude measures, and behavioral/skill-related predictors of sales performance and effectiveness. The final section summarizes the findings of the review. Methodological problems, including restriction in range, lack of information on predictor and criterion reliabilities, few cross-validation studies, and questionable generalizability of results to minority populations preclude conclusive evidence for determining whether and which of the many variables investigated successfully predict sales performance. Systematic efforts to identify and map multidimensional behavior-performance relations is suggested as a critical next step in enhancing prediction of sales performance.

RN 87-20 Training for Cognitive Complexity, Streufert, S.; Pogash, R.M.; Piasecki, M.T. March 1987. (AD A181 828) It is impossible to evaluate the effectiveness of training without adequate measurement techniques. In the research covered by this research note, measurement was accomplished through simulation technology; subjects were tested in a first simulation, and later re-tested. A consistent improvement in performance was found when people were given practical and conceptual information about how to apply conceptual stylistics to management efforts, especially decision-making. All measures of performance showed improvement.

RN 87-21 An NTC Live Fire Performance Analysis, Forsythe, T.K.; Doherty, W.J. April 1987. (AD A188 247) This research note describes the ARI effort to assess the training benefits derived by units going through the National Training Center (NTC), in particular the exploratory data analysis used to evaluate the performance of battalion task forces on the live fire range, using the contents of 54 Take-Home Packages from the years 1982 through 1984.

RN 87-22 Project A: Development and Field Test of Army-Wide Rating Scales and the Rater Orientation and Training Program. Appendixes to ARI Technical Report 716, Pulakos, E.D.; Borman, W.C. April 1987. (AD B112 857) The materials presented in this report were prepared under Project A, the U.S. Army's current, large-scale manpower and personnel effort for improving the selection, classification, and utilization of Army enlisted personnel. This portion of the Project A research sought to develop dimensions of soldier performance for evaluating first-term soldiers in any Military Occupational Specialty (MOS) and is reported in ARI Technical Report 716. A preliminary conceptual model of soldier effectiveness helped guide development of empirical scales. Behavioral analysis was used to identify and define effectiveness dimensions. The Skill Level I Common Task Soldier's Manual guided development of another set of rating scales in several task areas involving only first-term soldiers. A rater training program was prepared to help peers and supervisors make accurate evaluations using the Army-wide scales. The rating scales and training program were field-tested for nine MOS. A total of 904 supervisor and 1,206 peer raters evaluated 1,369 first-term soldiers. Results were encouraging. Raters appeared to understand and comply with instructions, rating distributions were acceptable, and interrater reliabilities were reasonably high. The field tests also provided information that guided refinement of both the rating scales and the rater training program. This Research Note presents additional documentation for the above research reported in ARI Technical Report 716.

RN 87-23 Predicting Military Recruiter Effectiveness: A Literature Review, Russell, T.L.; Borman, W.C. April 1987. (AD A181 830) This research note describes research on the identification of factors affecting military recruiter performance. Recruiter selection studies for four branches of the U.S. armed forces are summarized. Within the report, the studies are discussed according to the criteria against which the predictors were validated. The relative merits of various predictors are discussed, and criterion-related issues are described. The note's final section ties together selection research on civilian sales-type jobs, and the research done on selection of military recruiters, in order to further clarify the factors which produce successful recruiting personnel.

RN 87-24 Test Appendixes to ARI Technical Report 739: Development and Field Test of the Trial Battery for Project A, Peterson, N.G. (ed.). April 1987. (AD B113 802L) This Research Note supplements a report dealing with development and field test of a battery of experimental tests to complement the Armed Services Vocational Aptitude Battery in predicting soldier's job performance. This research was performed under Project A, the U.S. Army's large-scale man effort to improve selection, classification, and utilization of enlisted personnel. Results from an extensive literature review, expert judgments on validity of measures identified in the review, and administration of a preliminary battery of "off-the-shelf" measures guided the development of new tests. Three major types were prepared: paper-and-pencil tests of cognitive ability; computer-administered tests of perceptual/psychomotor abilities; and paper-and-pencil inventories measuring temperament, biographical data, and vocational interests. After iterative pilot tests and revisions, the measures were field tested. The resulting Trial Battery contains six cognitive paper-and-pencil tests, 10 computer-administered perceptual/psychomotor tests, and two paper-and-pencil inventories measuring temperament, biodata, and interests. It is being used in the next Project A phase, concurrent

validation executed with FY83/84 accessions to evaluate the predictor measures against subsequent job performance.

RN 87-25 Presupposition and Supposition in Everyday Intelligence and Learning, Wagner, R.K. May 1987. (AD A181 552) New conceptions of intelligence, with implications for learning, have come from the study of performance in more realistic situations. One such conception, functional theorizing, is the basis for two experiments examining the role of assumptions in everyday theorizing. These experiments suggest that success in everyday theorizing depends, at least in part, upon abilities and processes other than those responsible for high performance levels on traditional IQ tests.

RN 87-26 Knowledge Representation in the PUPS Theory, Anderson, J.R.; Thompson, R. May 1987. (AD A181 553) This research note is concerned with the PUPS theory of cognition. PUPS was developed from the ACT* theory in response to evidence about the importance of analogy to cognition. This report follows a general discussion of representation with a discussion of the analogy mechanism which drives the PUPS representation. A formal specification of the PUPS representation is next presented, and finally the connection between this representation and earlier propositional representations of the ACT* theory is discussed.

RN 87-27 Cognitive Modelling and Intelligent Tutoring, Anderson, J.R.; Boyle, C.F.; Corbett, A.; Lewis, M. May 1987. (AD A165 981) The ACT* theory of skill acquisition and its PUPS successor provide production-system models of skill acquisition in such areas as LISP programming, geometry theorem-proving, and the solving of algebraic equations. Knowledge begins in declarative form, and is used by analogical processes to solve specific problems. Domain-specific productions are compiled from the traces of these solutions. Model-tracing methodology has been developed as a means to display the cognitive theory in intelligent tutoring. Implementing the model-tracing methodology involves developing a student model, a pedagogical module, and an interface. Issues associated with the development of each of these components are also discussed. Work on tutoring and work on skill acquisition have proven to be symbiotic-each has furthered the other's development.

RN 87-28 The Sociology of the Army Reserves: A Preliminary Analysis, Moskos, C.C. May 1987. (AD A181 831) This research note outlines the ways that conventional military sociology does or does not apply to the active duty forces. Statistical data derived from social background variables and attitude surveys reveal: that the Guard and the Reserves are more "top heavy" in grade distribution than the active force, and they are older; that the active force and Reserves are better educated than the Guard, and have more female and minority-group members; that prior-service entrants in the Guard and Reserves are much more likely to score high in mental tests than non-prior service entrants, they are also better educated; dissatisfaction with service life is much higher in reserve forces than in the active force. The data show that, rather than viewing the reservist as part of a moonlighting labor force, we must face the truth. Reserve duty conflicts with family concerns, and causes problems for reservists with their civilian employers, as they ask for released time to fulfill military requirements. These factors create major disincentives to joining the reserve forces.

RN 87-29 Development of a Model of Soldier Effectiveness: Retranslation Materials and Results, Borman, W.C.; Motowidlo, S.J.; Rose, S.R.; Hanser, L.M. May 1987. (AD A181 832) This research note supplements ARI Technical Report 741. *Development of a Model of Soldier Effectiveness.* The research described was performed under the overall heading of "Project A", the Army's current effort to improve the selection, classification, and use of Army enlisted personnel. It is part of an effort to develop dimensions for soldier performance for use in an "Army-wide" rating scale. The rating scale will be used in evaluating first-term soldiers in any type of Military Occupation Specialty (MOS). A review of the literature and previous experience with enlisted soldiers provided the basis for a preliminary conceptual model of soldier effectiveness. Behavioral analysis workshops involving 77 officers and noncommissioned officers then provided more than 1300 examples of effective and ineffective soldier behavior. Another 61 officers and NCOs sorted these examples into categories, and rated the effectiveness levels of the behavior. Seventy-eight percent of the examples were retranslated into a single consistent category within a narrow range of effectiveness. Comprehensive definitions of behavior were prepared for each of the 11 dimensions represented. Behavior-based rating scales for use as Army-wide criteria in Project A validation research were then developed. This research note provides the lists of behavioral examples in the translation books, and the details of their analysis.

RN 87-30 Enhancing Small Group Cohesion and Effectiveness in Long Range Reconnaissance Teams, Pleban, R.J.; Valentine, P.J.; Thompson, T.J. June 1987. (AD A183 885) Research was conducted to evaluate whether small group cohesion and team mission effectiveness could be enhanced by creating teams that are initially compatible on relevant interpersonal qualities. Four 6-man Special Forces reconnaissance teams were observed over a 10-day reconnaissance field exercise. After the exercise, the teams were administered the Fundamental Interpersonal Relations Orientation Behavior (FIRO-B) questionnaire to assess team compatibility in specific need areas. Measures of team cohesion and performance were also obtained. While the evidence was not conclusive, the pattern of results suggest that the construct of compatibility, as assessed by the FIRO-B, may be an important mediator of both team cohesion and performance. Moreover, the FIRO-B may offer a cost-effective means of assembling small groups with the capacity for rapidly developing into cohesive and effective units.

RN 87-31 The Development of Valid Performance Measures for the 76C AIT Course (Equipment Records Parts Specialist), Cormier, S.M. June 1987. (AD A184 077) This report describes a methodology for producing validated end-of-cycle tests for Advanced Individual Training (AIT) courses at the Quartermaster School, Fort Lee, VA. Specifically, the methodology is presented for the four major duty positions of the 76C MOS (Equipment Records and Parts Specialist). This methodology can be applied to other AIT courses/schools to assure development of valid diagnostic performance measures.

RN 87-32 Productivity Improvement Efforts in Army Organizations: An Overview, Oliver, L.W.; Van Rijn, P. June 1987. (AD A184 060) This paper presents an overview of the types of productivity improvement efforts being conducted in both the civilian and military segments of the Army during 1983. The activities of the formal Army programs, which are associated with comptroller offices, typically reflect the traditional industrial engineer

approach stressing efficiency, with relatively little emphasis on behavioral science concerns. An exception is the Productivity Enhancement, Measurement and Evaluation Program, which includes projects such as quality circles that are based on behavioral science principles and techniques. The activities of the Army's Organizational Effectiveness (OE) Program do not usually make productivity improvement their principal focus, although productivity indicators may be used to evaluate OE operations. Examples of Army productivity improvement projects based on behavioral science approaches are presented. These include gainsharing, quality circles, and organizational interventions founded in sociotechnical systems theory. Problems encountered in the measurement of productivity are discussed, and a pilot study to develop and test measures of scientist/engineer productivity is also described. Recommendations made include (1) greater coordination and collaboration among people managing, planning, and implementing productivity improvement efforts; (2) use of multi-disciplinary teams in such efforts; (3) increased awareness of the difficulties involved in productivity measurement; and (4) the need for designing productivity measurement systems to ensure that they reflect organizational goals and are integrated with employee's personal goals.

RN 87-33 Recommended Alternate Qualification Courses for the M16 Rifle, Martere, R.F.; Hunt, J.P.; Parish, J.R. June 1987. (AD A183 872) This research effort was initiated to establish a standardized alternate rifle qualification course to be used by all components of the U.S. Army. Based on an Army-wide survey, two alternate rifle qualification courses were recommended: a Known Distance Alternate Course, and a 25-Meter Alternate Course. Data are presented for each alternate course of fire and appropriate scoring procedures are recommended. In addition, conduct of fire, alibi, and refire procedures are outlined. Adoption of the recommended alternate courses will provide standardized methods for rifle qualification with existent range facilities for all components of the U.S. Army.

RN 87-34 Multipurpose Arcade Combat Simulator (MACS): Year Two Report, Hunt, J.P.; Broom, J.M.; Greene, W.H.; Crawford, J.W.; Martere, R.F.; Parish, J.R. June 1987. (AD A184 179) This research effort was focused on three major areas of further research and development of the Multipurpose Arcade Combat Simulator (MACS): (1) hardware modifications of the MACS M16A1 rifle and its component parts; (2) software development for Advanced Rifle Marksmanship (ARM) skills with the M16A1 rifle; and (3) evaluation and refinement of existing MACS Basic Rifle Marksmanship (BRM) programs. Hardware modifications involved improvements to the light pen, light pen mount, and trigger switch. Development of MACS software programs involved the Light Antitank Weapon (LAW), trigger squeeze, and ARM. A major redesign of the BRM diagnostics program was completed.

RN 87-35 Basic Research in Human Factors, Deutsch, S.; Neilsen, E.F. June 1987. (AD A183 890) Six studies are in various stages of completion in the CORE program of the Committee on Human Factors. Preliminary drafts of reports on integrated ergonomic modeling, human performance models, mental models, and multicolored displays have been prepared and are currently in the prepublication review process. In addition, reports of the workshop on distributed decision making and the seminar on expert systems, both convened in late 1986, are being drafted. The technical plans have been completed for a panel meeting on human factors issues for an aging population. The committee is in the process of specifying its research agenda for the next study period.

RN 87-36 Quiet Reliable Generators for Corps and Division Headquarters: A Human Factors and Safety Evaluation, Ainsworth, J.S.; Smootz, E.R. July 1987. (AD A183 902) This research note presents the results of a human factors and safety evaluation of commercial and product-improved military generators designed to meet the Army's mobile electric power needs and noise limit standards. The evaluation was part of an operational test conducted by the TRADOC Combined Arms Test Activity (TCATA), at Fort Hood, Texas. The United States Army Engineer School (USAES), in conjunction with the Army Materiel Command (AMC), Forces Command (FORSCOM), and the Project Manager-Mobile Electric Power (PM-MEP) defined the test requirements and identified several commercial and military generators having the potential for satisfying the Army's needs and standards. Test results will be used to develop specifications for the acquisition of future generators.

RN 87-37 Appraisal of Army Training Battle Simulation System (ARTBASS) Training: Test Validation Phase, Garlinger, D.K.; Fallensen, J.J.; Solick, R.E.; Lussier, J.W. July 1987. (AD A183 522) ARTBASS is a computer-driven, real-time, free play, interactive combat simulation system designed for training maneuver battalion commanders and their staffs. The Combined Arms Training Activity (CATA) has requested that ARI conduct an assessment to determine, in quantifiable terms, the benefits of training with ARTBASS and to make recommendations concerning the frequency of training necessary to sustain learning. This report covers the validation of the testing instruments to be used for this assessment. The test instruments consist of two forms (Form A and Form B) to be used in a pretest posttest arrangement to assess learning by battalion command staffs, and two forms (Form A and Form B) to be used as pretest and posttest instruments to measure incidental learning by company commanders and scout platoon leader role players. Procedures followed for development of the tests, and the validation methodology are described. Reliability, validity, and parallelism results are provided. Copies of tests are included as appendixes to this report.

RN 87-38 The Development of Tactical Leadership Exercises for SIMCAT, O'Brien, R.E. July 1987. (AD A183 515) Tactical leadership exercises developed for implementation on SIMCAT, a low-cost platoon-level battle simulation, provide a means by which 19E BNCOC students can perform procedural tasks and command and control skills without the attendant high costs of equipment, fuel, ammunition, and training areas. The Single Tank Tactical Exercises are designed to provide tank commanders with the opportunity to perform procedural tasks and command and control, while moving their tanks over prescribed routes. The Tank Section Tactical Exercises are designed to provide tank section leaders (platoon leader and platoon sergeant), the opportunity to perform procedural tasks and command and control, while moving their sections over prescribed routes. These exercises also provide wingmen with the opportunity to perform section formations, and section fire command responses. The Tank Platoon Tactical Exercises are designed to provide tank platoon leaders the opportunity to perform procedural tasks and command and control while moving their platoons over prescribed routes. These exercises also provide wingmen with the opportunity to perform in platoon formations, and respond to platoon fire commands. The Tank Company Tactical Exercise is designed to provide the tank commanders with the opportunity to perform command and control while moving their companies over prescribed routes. This exercise also provides platoon leaders with the opportunity to participate in company level tactical exercises. The exercises provide a means by which small armor unit leaders can perform tasks and

command and control relating to the fundamental armor operational areas: SHOOT-MOVE-COMMUNICATE.

RN 87-39 Bradley Fighting Vehicle Gunnery Training Devices: Trainer Attitudes, Salter, M.S. July 1987. (AD A183 741) This report gives results of an attitudinal survey administered to Bradley Master Gunner students and instructors at Fort Benning in early 1986. Personnel rated the four Bradley gunnery training devices then available for use and/or demonstration. Attitudes toward the devices were more positive than expected. For this small sample, the Unit Conduct of Fire Trainer was rated highest, followed by the Bradley Subcaliber Device, the Bradley Gunnery and Missile Tracking System, and the Precision Gunnery System.

RN 87-40 A Cost and Training Effectiveness Analysis (CTEA) of Moving Target Engagement Training Programs for the M16A1 Rifle, Hunt, J.P.; Parish, J.R.; Martere, R.F.; Evans, K.L. September 1987. (AD A186 821) In June 1985 a research effort was initiated to examine current Advanced Rifle Marksmanship (ARM) Training at the Fort Benning Defense Test Range (DTR). This research effort examined alternate methods of training moving target engagement. Several variations of training devices and procedures were developed and evaluated. This note provides a cost and training effectiveness analysis (CTEA) of each alternative developed for training moving target engagements.

RN 87-41 Development of Computer-Based Instruction for MOS 76C, Skalny, F.J.; Marco, R.A. September 1987. (AD A188 364) This research note describes the work performed in analyzing, designing, producing, and validating the interactive courseware for the Equipment Records and Parts Specialist training course (MOS 76C).

RN 87-42 Information Processing Organizations With Acyclical Information Structures, Levis, A.H.; Tomovic, M.M.; Cothier, P.H. October 1987. (AD A188 980) Information theory models were used to analyze the effects of different perceptions of uncertainty and the relative value of tasks held by individual decision makers on organizational performance. The definition and evaluation timeliness as a measure of the effectiveness of command and control systems was also examined.

RN 87-43 Effects of Stress on Judgment and Decision Making in Dynamic Tasks, Hammond, K.R. October 1987. (AD A188 203) Expert weather forecasters were observed as they attempted to forecast hail, microbursts, and severe storms. Studies of judgment policies were also conducted with representations of storms. Modest agreement among forecasters was found in all three cases, but hail forecasts were found to be of low accuracy. Judgment models, an AI expert system, and seven forecasters showed about the same degree of accuracy. Current psychological theory concerning judgment and decision making was found to be insufficient for these circumstances.

RN 87-44 Canceled.

RN 87-45 A Programmer's Guide to the Sensory-Effector Interface, Barnett, K. October 1987. (AD A188 248) This document describes the Sensory-Effector Interface

(SEI) provided as part of the World Modeling System, and explains how to build a new SEI or extend the existing one.

RN 87-46 Operation of the World Master in the World Modeling System, Barnett, K. October 1987. (AD A188 979) This research note describes the operation of the World Master process of the World Modeling System. It is intended to be an aid to maintainers of the World Master, and implementors of additional simulated physical properties of the world.

RN 87-47 Canceled.

RN 87-48 Experimental Studies of Novice Computer Users, Foss, D.J. October 1987. (AD A189 232) This research note examines the dynamics of the changing goal structure of a novice learning and carrying out computer-based tasks. Novices were provided with either a surrogate model for learning text editing, two versions of learning manual syntax, or two versions of manual organization. Results showed no effects due to surrogate models, but significant improvements in learning due either to more concrete learning model syntax, or a layered manual organization. Contradictory effects on training transfer were found.

RN 87-49 Concepts and Nomenclature in the World Modeling System (A Lesson in Applied Metaphysics), Hood, G. October 1987. (AD A188 246) This research note provides the nomenclature information necessary to create a World Modeling organism or simulation. Nomenclature for worlds, objects, organisms, views, images, times, and states is provided. Information on checkpointing, tracing, creating log and image files, implementation guidelines, and file formats is also included.

RN 87-50 Learning by Experimentation, Carbonell, J.G. October 1987. (AD A188 912) This research note addresses the issue of learning by experimentation as an integral component of PRODIGY, a flexible planning system augmented with capabilities for execution monitoring, and dynamic replanning upon adverse feedback. A detailed example of integrated experiment formulation is presented as the basis for a systematic approach to extending an incomplete domain theory or correcting a potentially inaccurate one.

RN 87-51 Human Problem Solving in Dynamic Environments: Understanding and Supporting Operators in Large-Scale, Complex Systems, Henneman, R.L.; Rouse, W.B. October 1987. (AD A189 539) This research note seeks an empirical understanding of the relationship between the physical characteristics of a large-scale system and human performance, and formalizing these empirical results into several measures of large-scale complexity. Behavioral computer models of the human operator in a large-scale environment were then constructed, and the models were found consistent with human behavior. This approach showed subtle performance improvement for aided subjects.

RN 87-52 Text Organization and Comprehensibility in Technical Writing, Dee-Lucas, D.; Larkin, J.H. October 1987. (AD A188 913) Technical texts often introduce scientific principles by deriving the principle prior to stating it. This "proof-first" organization violates writing guidelines suggested by current text learning theories. The current research compares the effect on comprehension of this type of structure with its logical alternative a

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"principle first" structure. Results indicate that readers spend more time with information when it occurs first. Thus, the principle-first structure focuses attention on the principle, and the proof-first structure (not surprisingly) focuses attention on the proof. Additionally, readers find it easier to predict what is important in principle-first texts, and used the principle-first approach more often in summarizing. These findings indicate that readers find the information in a principle-first organization easier to process and store. Ongoing research is investigating differences in what readers learn using these two structures.

RN 87-53 Optimizing the Long-Term Retention of Skills: Structural and Analytic Approaches to Skill Maintenance, Healy, A.F.; Ericsson, K.A.; Bourne, L.E., Jr. October 1987. (AD A187 002) The program described in this research note seeks to identify characteristics of knowledge and skills which are most resistent to decay due to disuse. The program is divided into analytic and structural approaches. The first line of research for investigating skill retention using the analytic approach investigates laboratory analogues to the component skills of electronic technicians. The second approach investigates parallel natural skills learned by former college students. We have developed five laboratory methodologies, and have completed the preliminary testing for each of them. We have also identified four natural skills, designed the initial questionnaires and tests, and collected preliminary data for all of them. For the structural approach, we have designed an experimental paradigm which allows us to assess the detailed encoding of new knowledge at presentation and after a delay, using verbal report techniques and chronometric measurement of retrieval components. A preliminary study of retention of vocabulary items has been completed within this paradigm.

RN 87-54 Improving the Selection, Classification and Utilization of Army Enlisted Personnel: Annual Report, 1985 Fiscal Year-Supplement to ARI Technical Report 746, Campbell, J.P. (ed.). October 1987. (AD A188 267) The materials presented in this research note were prepared as part of "Project A", the Army's current large-scale manpower and personnel effort, which seeks to improve the selection, classification, and utilization of Army Enlisted personnel. This note supplements ARI Technical Report 746, the Project Annual report for the 1985 Fiscal Year. It augments that report by providing copies of a set of technical papers that were prepared during the year reporting in detail on phases of the project research method, and the results.

RN 87-55 Effect of Martial Arts Training on Expression and Control of Violence, Carrera, R.N November 1987. (AD A186 919) This literature review begins by describing sources of aggression as provided by laboratory, psychoanalytic, and sociobiological approaches. These sources include environmental events (laboratory approaches), the death instinct or Thantos (psychoanalytic approaches), and learning rules that are ecologically evolved (sociobiological approaches). The paper then traces the development of martial arts in Asia and outlines psychological studies of martial arts that suggest that it would tend to increase violent tendencies. The paper concludes by reviewing a number of psychological factors that may serve as mediating mechanisms between the martial arts and the realistic control of violence. By including these factors, it is believed that a pattern of instruction can be embedded in a framework of martial arts training of sufficient intensity to take participants through the basic white belt level. The author concludes that such a program should have the

effect of improving self esteem, self control, and general military effectiveness at both the unit level and for the individual soldier.

RN 87-56 Individual Differences in Hemispheric Specialization, Glass, A. (ed.). November 1987. (AD A189 282) Neurologists, psychologists, and neuroanatomists have long recognized that the left cerebral hemisphere is specialized for language and possibly other symbolic processes, and that the right hemisphere on the same side as the preferred hand has also long been understood. Individual variation in degree and direction of specialization due to gender and handedness has, until recently, been regarded as a barrier to the investigation of lateralization, and at the same time individual differences have been used to explain differences in lateralization measurements on a post-hoc basis. Cross-comparisons of several methods for assessing hemispheric specialization have been made in this volume, methods such as perceptual/behavioral, clinical/neurological, electrophysiological, and "real-time" techniques for assessment of cerebral orientation. Errors of assessment should thereby be differentiable from individual variations in hemispheric specialization. It is the consensus of those whose views are expressed in this research note that hemispheric specialization may reemerge, not as a monolithic, absolute structural concept, but as a dynamic process, modulating the utilization by differential strategy, activation, and arousal, of a relative structural specialization of the hemispheres in individual subjects. The research note also considers the importance of these concepts for psychopathology.

RN 87-57 The 1986 ARI Survey of U.S. Army Recruits: Survey Administration, Levine, E.L. November 1987. (AD A187 003) This research note discusses the 1986 administration of the ARI New Recruit Survey, conducted during June, July and August of that year, by carefully selected and trained administrators at eight reception battalions. The total number of cases collected was 14,347, which included 7,971 Regular Army recruits, and 6,376 Reserve/National Guard recruits. The overall response rate was 88.6%. Recommendations for future surveys are made. This is a supplementary report produced to document the administration of the 1986 Army Research Institute of U.S. Army Recruits, also known as the New Recruit Survey (NRS). Separate volumes document the survey data files for respondents. Other reports in this series provide more extensive background documentation of the 1986 survey. Tabular descriptions which present the preliminary results of the 1986 survey separately for each Army component are also available.

RN 87-58 A Review of Models of Cost and Training Effectiveness Analysis (CTEA). Volume I: Training Effectiveness Analysis, Goldberg, I.; Khattri, N. October 1987. (AD A189 198) This research note reviews the formal predictive and prescriptive models of training effectiveness analysis and related Army guidance. Most of the models are concerned with the analytic formation of entire training programs early in the weapons systems acquisition process. Some models also include manpower, personnel, and human factors considerations. A number of models focus on the formulation of training devices and simulators. Computer Based Instruction (CBI) has not often been included in early formation of training programs for new weapons systems. Possible reasons for this finding are discusses. Most of the training program models also include a cost model, but the cost models are not necessarily adequate. The models concerned with training devices and simulators do not have associated cost models. The lessons learned included the following: 1) there are many useful models

available for the formulation of training programs early in the weapons systems acquisition process; 2) the validity of these models needs to be tested, recommendations are given for comparative validity studies; 3) models for training devices and simulators appear to need further development, related cost models, and validation; 4) further attention needs to be given to formal CTEA models for advanced phases of the weapons system acquisition process, and for non-system training.

RN 87-59 A Review of Models of Cost and Training Effectiveness Analysis (CTEA). Volume II: Cost Analysis, Adams, A.V.; Rayhawk, M. October 1987. (AD A189 645) Cost and training effectiveness must be considered jointly in considering how to meet training requirements. Cost predictions for various training alternatives are not at their most valuable in the early stages of a weapon system's life-cycle, and this report discusses the problems encountered with data availability at this stage. A cost model must incorporate economic concepts as opposed to purely accounting costs. The economic ideas embedded in CTEA are discussed, and the search for, and difficulties in developing and applying, a generic CTEA model are addressed. Finally, building on earlier reviews, 17 cost models and guidebooks are examined in terms of purpose of development, features included, usefulness in the early stages of weapon system development, and strengths and weaknesses of the model or guidebook. In a summary on the lessons to be learned, the more advanced state of training effectiveness development is noted; suggestions are made for new research on costing; continued early coordination between system designer, training developer, and cost analyst is advocated; and comparison-based methods are recommended as one means to address data problems in the early stages of system development.

RN 87-60 1986 Early Career Satisfaction Survey: Technical Manual, Lockhart, D.C.; Wagner, M.; Cheng, C. November 1987. (AD A189 449) The purpose of the effort described in this research note was fourfold: 1) to obtain data files for the Enlisted Decision Surveys, b) to collect information from respondents, c) to process and analyze data, and d) to prepare survey documentation. The enclosed technical manual contains the documentation and data source/codebook describing the survey procedures, methodology, results, and lessons learned.

RN 87-61 Modeling the Individual Enlistment Decision: Phase I Final Report, Kralj, M.M.; Adelman, L.; Wilson, M.; McTeigue, R.J.; Zirk, D.A. November 1987. (AD A189 481) This research note reviews the findings of PAR's effort in modeling phase one of the enlistment decision. The note includes a brief review of Tasks One and Two (a literature review of decision models applicable to the individual enlistment decision, and the empirical assessment of pre-decisional processes involved in the enlistment decision, respectively). The design and development of new quantitative measurement instruments is discussed in detail. These last include: 1) a summary of a reliability assessment of an expectancy model derived scale conducted on data from the 1984 New Recruit Survey; 2) a discussion of the development of two measures, one derived from the Fishbein and Ajzen model (a likert scale), and a decompositional approach using a paired choice format; and 3) the methodology and results of a pilot test of the 2 new measures. The results of these efforts are discussed in terms of their implications for the Phase II data collection stage of the contract. Finally, copies of all measures developed are appended, as well as the respondents' answers to a set of demographic questions

included in the pilot instruments that can be used to estimate respondents' performance on the Armed Forces Qualification Test composite on the Armed Forces Vocational Aptitudes Battery.

RN 87-62 Predecisional Processes Involved in the Enlistment Decision, McTeigue, R.J.; Kralj, M.M.; Adelman, L.; Zirk, D.A.; Wilson, M. November 1987. (AD A189 597) This note describes a data collection effort conducted to assess the predecisional processes involved in the enlistment decision. Focus groups were conducted in five major metropolitan areas, and a total of 49 individuals, from 17 to 20 years of age participated. The focus group discussions were video-taped, transcribed, and analyzed to identify critical factors which influenced the prospect's enlistment decision. The results indicated that the respondents considered both monetary (salary, benefits, economic funding, training) and non-monetary factors (e.g., satisfaction, responsibility, adventure, personal growth) in reaching their decisions regarding enlistment and career choice. In addition, two major influences emerged as salient to their decision process: positive coursework experiences in school, and knowledge about their parents' career histories. Recruiters were cited as the major source of information regarding the Army. Geographically related differences in these factors and influences were noted. The findings are discussed in terms of the implications for further refinement of a model of the individual decision.

RN 87-63 World Modeler SEI Library Builder, Shell, P. December 1987. (AD A189 474) This research note describes two different libraries (sensor and effector), which provide a data type called the sensor. The sensor libraries allow an organism program to receive environmental data in different forms and degrees of filtering, while the effector libraries allow the organism to adapt to the environment in a "fair" way.

RN 87-64 A Framework for a Theory of Mapping, Collins, A.; Burstein, M. December 1987. (AD A191 071) This research note is divided into three main sections: The first distinguishes the different kinds of information that are related by analogy and similarity mappings. The second section discusses the different contexts or tasks that give rise to mappings. The third section catalogues different solutions proposed or possible for each issue. The note concludes by arguing that the issue is not *whether* analogies are helpful or harmful, but what determines *when* they are helpful and when they are harmful.

RN 87-65 Issues in Psychological Research and Application in Transfer of Training, Holt, V.E. (ed.). December 1987. (AD A190 645) This research note is a collection of papers and summary recommendations resulting from a two-day workshop focused on training transfer. Supported by the Army Research Institute, the workshop featured presentations by academic, non-academic, and military laboratory scientists on psychological research and applications related to transfer of training. Among the specific topics dealt with are: the development of cognitive simulation models, skills development methods, the need for intelligent job aids, cognitive task analysis, and methods for measuring job performance. Recommendations for further research and applications are provided.

RN 87-66 Novice Importance Rules: Definitions and Equations, Dee-Lucas, D.; Larkin, J.H. December 1987. (AD A190 852) This research note indicates that novices judge

importance in texts according to sentence type category (definitions, facts, equations, etc.). Subjects varying in expertise judged the importance of sentences in physics texts when these sentences were presented in one of two forms: 1) definitions or facts, 2) equations or verbal formulae. Experts and subjects without physics training judged these variants similar or equal in importance. However, beginning physics students judged definition and equation versions as more important. Thus, sentence form is a salient text feature for beginning-level students who have developed general rules about what categories of information are important in physics. Sentence category is irrelevant for experts, who have rich content schemes allowing them to judge importance directly. Sentence category also has little effect on people without physics training, who lack strong expectations regarding what types of information are important. These results have theoretical implications for understanding content schema development and practical implications for textbook writers.

RN 87-67 Analysis of Bradley Fighting Vehicle Gunnery With Emphasis on Factors Affecting First-Round Accuracy of the 25-mm Gun, Perkins, M.S. December 1987. (AD A190 698) Analysis of the problems and potential improvements in gunnery effectiveness of the Bradley Fighting Vehicle (BFV) led to research and development focusing on equipment, procedures, and training related to first-round accuracy with the 25-mm automatic gun. Areas addressed included boresighting equipment and procedures, zeroing, range estimation, range cards, aiming rules, preliminary gunnery training and full caliber gunnery. As a result of close coordination with proponents and users concerned with these areas, problem areas have been recognized and solutions either are being or will be developed in efforts to improve gunnery effectiveness.

RN 87-68 Measures of Similarity Between Fuzzy Concepts: A Comparative Analysis, Zwick, R.; Carlstein, E.; Budescu, D. December 1987. (AD A189 430) This research note discusses the selection of an appropriate index to measure the similarity between fuzzy subsets (concepts). The RN reviews 19 measures of linguistic approximation procedures, and compares their performance in a behavioral experiment. For categorizing pairs of fuzzy concepts as "similar" or "dissimilar" all measures performed well. For distinguishing degrees of similarity of dissimilarity, however, certain measures were superior. The best measures focus on only one "slice" of membership function.

RN 87-69 The Display of Multivariate Information: The Effects of Auto and Cross-Correlation, Reliability, and Heterogeneity, Jones, P.M.; Wickens, C.D. December 1987. (AD A191 070) Typically, process control systems involve many variables which can be correlated with one another (cross-correlated), correlated with themselves (auto-correlated), and which are represented by displays possessing varying degrees of reliability. This study examined these factors in an information integration task, which compared the relative advantages of integral and separable displays. The degree of cross-correlation between the cues and the heterogeneity of cue reliability were varied factorially between subjects: the input dynamics and display were varied factorially with subjects. Results indicated in advantage for cross-correlated information for the integral display, and also showed a surprisingly strong benefit for the integral display given uncorrelated, randomly-varying information. The results are interpreted within the framework proposed by Wickens

and his colleagues (Casey and Wickens, 1986; Kramer Wickens, Goettl, and Harwood, 1986; Wickens 1986a), that of the "display proximity advantage".

RN 87-70 A Comparison of the Analytic Hierarchy Process and the Geometric Mean Procedure for Ratio Scaling, Budescu, D.V.; Zwick, R.; Rapoport, A. December 1987. (AD A191 069) This research note evaluates and compares the performance of two methods of ratio scaling [the analytic hierarchy process proposed by Saaty (1977, 1980), and the geometric mean procedure advocated by Williams and Crawford (1980)] when random data are supplied. The two methods are examined in a series of Monte Carlo simulations for two response methods (direct estimation and constant sum) and for various stimuli responds methods (direct estimation and constant sum) and for various stimuli and response scales. The sampling distributions of the measures of consistency of the two methods are tabulated, rules for detecting and rejecting inconsistent respondents are outlined, and approximation formulas for other designs are derived. Overall, there is a high level of agreement and correspondence between the results from the two scaling techniques. We conclude that the present results reinforce Williams and Crawford's claim for the superiority of the geometric mean procedure.

RN 87-71 Problem Solving in a Natural Task as a Function of Experience, Lancaster, J.S.; Kolodner, J.L. December 1987. (AD A191 180) This research note investigates the effects of experience on problem solving behavior and the knowledge base of workers in an applied setting that of automobile mechanics. The automobile is a highly complex system with many interconnected subsystems. Problem descriptions presented to a mechanic who needs to diagnose a car are usually quite sketchy, however. Novices are less able than experts to diagnose any but the most obvious problems. This research note concerns itself with identifying the qualitative differences between mechanics with different levels of expertise. In this research note, three student mechanics are observed in a post-secondary technical school, each at a different level of expertise, diagnosing six problems introduced into cars in the school. Collected protocols are then analyzed to find the knowledge and strategies used in solving each problem. Series of protocols for each student were also analyzed to find the changes in knowledge and strategies used in solving later problems as compared to earlier problems. Differences were seen in both the knowledge used by the subjects and in their general approach to diagnosis. As a result of experience, the student mechanics seemed to improve in three areas: 1) their knowledge of the relationships between symptoms and possible failures was augmented, 2) their causal models of the car's symptoms and possible failures was augmented, and 3) their general troubleshooting procedures and decision rules were much improved.

RN 87-72 A Computational Model of Motor Behavior, Iba, W.; Langley, P. December 1987. (AD A191 179) Generating even simple motor behavior using artificial manipulators has proven to be a very difficult task. A computational model of motor behavior is presented that assumes three inputs: a limb to carry out motor commands, a viewer-centered schema describing the desired behavior, and a sensory-motor interface allowing two-way communication between the agent and the environment. A motor schema is defined as a memory structure containing a few positions from the trace of a movement. The model then produces intervening points between those in the schema. A viewer-centered schema is transformed into its dual representation, facilitating execution of the desired movement on the limb. These two forms of a schema represent the same points in three-dimensional space,

but behave in ways which have important differences when they are acted upon by the model. Our model accounts for a number of phenomena from the literature, including the speed/accuracy tradeoff, and the closed and open loop distinction. The model suggests directions for further experimentation.

RN 87-73 A Comparison of the Army's Project A Cognitive and Psychomotor Tests to Analogous Air Force and Navy Tests, Czarnolewski, M.Y. December 1987. (AD A188 636) This report describes predictor batteries measuring cognitive abilities and psychomotor skills that are being developed by the research efforts represented by the Army's Project A, the Air Force's Learning Ability Measurement Program (LAMP) and Basic Attributes Test (BAT) Program, and the Navy's spatial abilities effort. Much of the enclosed information regarding the Air Force and Navy measures is based on R.E. Christal's reports on cognitive tests developed by TTCP Services (Christal, 1984, 1985). Comparisons made between Project A measures with those of the other service concentrate on: (a) conceptual comparisons (i.e., the construct representativeness and methodological paradigm on which the tests are based); and (b) operational comparisons, i.e., matching each Project A test to similarly constructed tests developed by the other two services).

RN 87-74 ARI-POM Database Development Plan, Briscoe, J. December 1987. (AD A190 586) This research note presents a plan for the development of an enhanced NTC database system for the Army Research Institute's Presidio of Monterey Field Unit. It lays out a series of four steps, each with a deliverable, or set of deliverables, which should result in an NTC database system that will support the research requirements of ARI-POM, and of the NTC research community for the foreseeable future.

RN 87-75 NTC Tactical Database Preliminary Design (Revised), Briscoe, J.A.; Baldwin, J.D. December 1987. (AD A190 585) This research note documents the finalized design of the revised NTC Tactical Database. In its preliminary form, this document was distributed to potential users of the Database in order to solicit their comments, and factor their input into the total design. All recommendations were reviewed, and relevant additions were made prior to the detailed design phase. In its present form, the note represents the Tactical Database as developed. It includes some background, i.e., the rationale for the two-layered database approach, the naming convention adopted for tactical databases, and the explicit format for each of the nineteen tables that the final Tactical Database contains. It may be used as a planning document for NTC research and analysis efforts, including the design of derivative technical (issue-oriented) databases.

RN 87-76 Platoon-Level Battlefield Simulation Functional Requirements, Sunderland, S.A. December 1987. (AD A191 457) This research note contains the functional requirements for the Platoon-Level Battlefield Simulation (PLBS), which will be used for conducting research on how to train command, control, and communication skills in a classroom environment. Included are the process and representation requirements for terrain, movement, detection/identification, engagement, indirect fire communications, resource audit, time, post-simulation, and initialization.

RN 87-77 Hill-Climbing Theories of Learning, Langley, P.; Gennari, J.H.; Iba, W. December 1987. (AD A191 237) This research note proposes "hill climbing" as a metaphor for much of human learning, and considers a number of computer systems that learn in this manner. The paper focuses on CLASSIT, a model of concept formation that incrementally acquires a conceptual hierarchy, and MAGGIE, a model of skill improvement that alters motor schemes in response to errors.

RN 87-78 The Representational Code of the Internal Model of Dynamic Systems: An Individual Differences and Dual Task Approach, Wickens, C.D.; Weingartner, A. December 1987. (AD A190 876) When a human operator monitors and controls complex dynamic processes, it is assumed that an internal representation of the process directs the operator's actions. This internal model is presumed to lie at some point along a verbal-spatial continuum. In order to determine the point on this continuum, nine subjects with high verbal and low spatial abilities, and nine with low verbal and high spatial abilities performed a multi-element failure detection task, either by itself, or concurrently with either a verbal or spatial secondary memory task. Patterns of interference between the maintaining and updating of the internal model and the performing of the memory tasks were used to infer the mode of internal model employed by the subjects. Interference results confirm that the failure detection task is spatial, and, as expected, verbal subjects performed better on the verbal secondary task and spatial subjects performed better on the spatial one. Both ability groups demonstrated similar failure detection abilities, and generated similar patterns of dual task interference. These results indicated that all subjects adopted the same strategy for failure detection.

RN 87-79 Canceled.

RN 87-80 Visual Display Representation of Multidimensional Systems: The Effect of Information Correlation and Display Integrality, Casey, E.J.; Wickens, C.D. December 1987. (AD A188 655) This research note provides data on the use of object and schematic face displays to present dynamic multivariate system information. Twelve subjects detected and diagnosed failures in a system whose variables were intercorrelated. Three visual analog displays (a bar graph display, a pentagon, and a schematic face display) represented the system. These displays differed in the degree of integrality of their component features. Detection performance yielded a speed/accuracy tradeoff with little evidence of superiority for any of the displays. Diagnostic performance showed a superiority for the more separable display, however. This superiority was attributed to the fact that diagnosis required subjects to focus attention directly on a single attribute, a focussing that benefited from a display which separated the attributes from one another. The results of the study are discussed in a broader context of other studies which looked at the proximity of information. The data also demonstrated the promise of the schematic face display as a means of displaying dynamic system information.

RN 87-81 Extracting Information From Problem Solving Experience, Kolodner, J.L. December 1987. (AD A191 331) Much of the problem solving which is performed involves consideration of previous similar situations. Access to previous experience keeps the problem solver from avoiding past mistakes, and aids in the derivation of shortcuts for

reasoning. This research note outlines the research studying the processes that comprise this problem solving style. Topics outlined include: organization of cases and generalized knowledge in memory, knowledge structures, the evolution of knowledge structures, analogical problem solving, and failure-driven learning.

RN 87-82 Extending Problem Solver Capabilities Through Case-Based Inference, Kolodner, J.L. December 1987. (AD A191 332) This research note reviews work done on case-based reasoning. In this sort of reasoning, the problem solver makes inferences based directly on previous cases rather than using the more traditional method of reliance on general knowledge. Case-based reasoning results in several enhancements to problem-solving behavior over time. First, recall of previous failures warns the problem solver of the potential for failure, and allows it to avoid the repetition of past mistakes. Second, the previous decisions that have been made are suggested to the problem solver so that its decisions do not all have to be made starting from scratch. This lessens the search space, and also serves as a way of shortcutting the constraint satisfaction process. Third, if schemata can be derived from cases that have been seen previously, generalized knowledge can be augmented. This allows real shortcuts in problem solving. Decisions that previously took several steps in reasoning to make may become easier through the application of a generalized schema.

RN 87-83 Capitalizing on Failure Through Case-Based Influence, Kolodner, J.L. December 1987. (AD A190 927) Previous failures to solve problems can be a powerful aid in helping a problem solver to improve. When prior cases in which an error was made are recalled (e.g. common sense mediation of everyday disputes and menu planning), the reasoner may consider whether the same potential for error exists in the new case. As a result, reasoning is directed to that part of the current problem that was responsible for the previous error, sometimes changing the problem solver's focus. Focus may also be directed toward gathering knowledge to evaluate the potential for error in the current case. A case with an error may also suggest a correct solution for the new problem. The combination of these helps the problem solver to avoid repeating mistakes and suggests shortcuts in reasoning that avoid the trial and error of previous cases.

RN 87-84 Human Problem Solving in Complex Dynamic Environments, Rouse, W.B.; Henneman, R.L. December 1987. (AD A190 788) This research note summarizes three years of a four year contract to study ways of improving human performance in highly integrated systems in such areas as communications, transportation, manufacturing, etc. Rule-based computer models of human performance (CAIN) are discussed, as are methods for measuring the complexity of the task of monitoring these large-scale systems. Finally, the development of a computer model (MABEL) which requires subjects to monitor a large-scale communications network is described.

RN 88-01 LispSEI: The Programmer's Manual, Tallis, H. January 1988. (AD A191 632) This research note provides a listing of the lowest level lisp functions, as well as a more precise definition of the capabilities of the different layers of the SEI. It also separates filtering from basic copying operations, shows how to hide the C code within the SEI, and cleans up some other unnecessary hair in the current SEI implementation.

RN 88-02 Literature Review: Utility of Temperament, Biodata, and Interest Assessment for Predicting Job Performance, Hough, L.M. January 1988. (AD A192 109) The research described was performed under Project A, the U.S. Army's large-scale, multi-year manpower and personnel effort for improving the selection, classification, and utilization of Army enlisted personnel. This report is one of three derived from an extensive literature review aimed at identifying many types of constructs that might be used to enhance the accuracy of the present Army screening system (the other two reports deal, respectively, with cognitive abilities and psychomotor abilities). The present report is divided into three sections, each dealing with the utility of one type of information for predicting job performance. The section on temperament discusses traits as the basis for temperament assessment, several methods of scale construction, comparison of psychometric properties, a proposed taxonomy of temperament scales, criterion-related validity, and various moderator variables. The section on biographical data discusses measurement methods and concerns, structure and conceptual issues, and validity, and various moderator variables. The section on biographical data discusses measurement methods and concerns, structure and conceptual issues, and validity research. The section on interest assessment discusses various methods of measuring interests, models and theories, and validity research.

RN 88-03 CHALLENGE: An Experimental Computer Program for Research on Organizing Knowledge To Improve Retention and Application, Kern, R.P.; Legree, P.J. February 1988. (AD A190 629) This research note reports on CHALLENGE, a theoretically based computer program undergoing experimental development. The purpose of this program is to assist students in organizing their knowledge of selected topical domains, and to provide a representation of how they have organized their knowledge during a given session. This research note summarizes the research background, and describes a cyclic series of pilot runs conducted to obtain critiques on screens, instructions, responses required of the user, and attitudes regarding the way the user had to interact with the program. The resulting revision, CHALLENGER II, is now being submitted to experimental testing in an instructional setting with college students.

RN 88-04 Selection and Effects of Channels in Distributed Communication and Decision-Making Tasks: A Theoretical Review and a Proposed Research Paradigm, Reder, S.; Conklin, N.F. February 1988. (AD A191 807) This research note examines the relationships between the communication patterns of decision groups and the nature and results of their decision processes. It looks at the selection of particular channels and channel effects, as well. A review of research indicates that no satisfactory theoretical framework has yet been developed which accounts for the often strategic and tactical nature of communication channel selection. An initial theory is outlined, establishing quantifiable relationships among causally linked sets of variables: 1) characteristics of the decision group (size, structure, and spatial dispersion), 2) characteristics of the decision task (nature of the decision, perceived organizational significance, time available, and available communication channels), 3) channel selection(s) made by the group, 4) structural and content characteristics of the messages produced, 5) decisions reached, and 6) perceived characteristics of the decision process.

Research Notes

RN 88-05 Optimizing Feedback Utilization in Motor Skills Training, Schmidt, R.A.; Shapiro, D.C. February 1988. (AD A191 559) This research note deals with the acquisition of motor skills, specifically with the optimal use of feedback on goal achievement (termed knowledge of results, KR) for the maximization of learning and retention. A great deal of evidence suggests that enhancing the amount or quality of KR can improve performance in a session where KR is present, but limited evidence suggests that this might not be effective on a delayed criterion test when KR is removed a typical goal of many Army training settings. Two variations of KR were studied: relative frequency the proportion of trials receiving KR, and summary KR where KR is given about an entire set of trials. In each case, alterations in KR which degraded training performance (relative to a condition with KR on each trial) actually produced *enhanced* performance on a delayed no-KR retention test. A third paradigm examined the learning of error-detection capabilities as a basis for these effects. Overall, six experiments suggest that enhancing KR in acquisition may generate KR overreliance, preventing the learning of important features of the task which are critical for retention of performance when feedback is removed or degraded (e.g. in marksmanship). Our results have implications for improved feedback in training.

RN 88-06 Models of Incremental Concept Formation, Gennari, J.H.; Langley, P.; Fisher, D. February 1988. (AD A191 597) Given a set of observations, humans acquire concepts that organize those observations and use them in classifying future experiences. This type of concept formation can occur in the absence of a tutor and it can take place despite irrelevant and incomplete information. A reasonable model of this human concept learning should be both *incremental* and capable of handling the type of complex experiences that people encounter in the real world. In this paper, we review three.

RN 88-07 The Relationship Between Technology and Organizational Structures: Empirical Truth or Theoreticians' Wishful Thinking?, Miller, C.C.; Glick, W.H.; Wang, Y.D.; Huber, G.P. February 1988. (AD A196 606) This research note reviews and analyzes the results of 34 empirical studies of technology-structure relationships. Previous reviewers have concluded that the across-study variation among sample correlations is attributable to differences in definition of technology, unit of analysis, and measurement strategy. These reviewers did not examine three theoretically important explanations for the mixed results: differences in 1) organizational size, 2) degree of professionalization, and 3) organizational sector. Meta-analyses indicate that these previously unexamined explanations are important for understanding the technology-structure relationship.

RN 88-08 Assessment of the Relationship Between Asymmetry in Cerebral Hemisphere Arousal and Perceptual Asymmetry, Green, J.; West, P.D.; Engler, H.F., Jr. June 1988. (AD A196 608) The research discussed in this research note had for its purpose the examination of this question: is the relative functioning of each cerebral hemisphere's perceptual speed (perceptual asymmetry) related to the relative arousal of each cerebral hemisphere (arousal asymmetry). The results of a lexical decision class (language processing) support Levy's contention that with left hemisphere arousal there is a proportionate increase in right visual field advantage.

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RN 88-09 Anticipatory Heart Rate Responses of Motor Vehicle Drivers Riding as Passengers, Henderson, P. January 1988. (AD A194 365) The heart rate of drivers and non-drivers was recorded while they were being driven around a circuit on public roads for the experiment described in this research note. As the vehicle negotiated a "hazard", the heart rate of the drivers increased markedly, while the heart rate of the non-drivers did not. A second study showed similar but smaller differences between experienced truck drivers being driven around a course by newly qualified drivers, and experienced drivers being driven by other experienced truck drivers. Those driven by the newly qualified drivers had the higher response. A third study showed an elevated response in a group of trainee truck drivers over a nine-day course of instruction. These findings are discussed within the wider context of shared driving on long journeys.

RN 88-10 Junior Officer Competency Model: Research Results and Applications, Cullen, B.J.; Klemp, G.O., Jr.; Mansfield, R.S. February 1988. (AD A193 517) Through the methodology of Job Competence Assessment this report identified a set of individual attributes required for effective performance as a junior officer. From an initial target sample of 300 junior officers in six branches (Infantry, Field Artillery, Air Defense, Artillery, Engineer, Signal and Transportation/Quartermaster) at four Army installations (Forts Bragg, Carson, Riley and Stewart) a final sample of 56 superior and 49 satisfactory performers were identified. Found to clearly distinguish between superior and average performers were the following competencies: planning, initiative, concern for standards, self-confidence, job involvement, willingness to confront others, concern with image, concern for clarity and realistic positive attitudes, junior officers and 2) assess the effectiveness of various ROTC training programs, were developed. A combination of these instruments was found to be needed to predict both overall ratings and individual competencies.

RN 88-11 Semantics of Procedures: A Cognitive Basis for Maintenance Training Competency, Moran, T.; Russell, D.M.; Jordan, D.; Jensen, A.; Orr, J.; Rypa, M. April 1988. (AD A194 403) In 1984, the Army Research Institute initiated a three year project to study, design, and develop instructional environments to enhance the learning of procedural troubleshooting skills for the maintenance of complex machines. The goal of the project was to identify how artificial intelligence technologies could be used to create better technical proficiency instruction for maintenance personnel. Initially, the effort focused on the role of conceptual and procedural knowledge in troubleshooting, and on the ways that procedural skills can be learned as meaningful structures. Various types of computational tools were used to extract analyze, and represent the structure of diagnostic procedures, expertise in troubleshooting the field, and the nature of mental models of complex machines, and the role of such models in causal reasoning. Simulation and qualitative modelling studies were conducted to determine the role of mental modelling in instruction, and to investigate how simulation of machine behavior and repair strategies can provide maintenance personnel with a means for understanding machine components, functions, and troubleshooting procedures. The investigation of instructional strategies for teaching diagnostic skills led to the development of an interactive design and development system the Instructional Design Environment (IDE). IDE is a prototype interactive design and development system that assists instructional designers in the process of creating complex instruction. Put another way; it is essentially a knowledge structuring system, in which the knowledge is course content, structure, and

instructional method. It accepts knowledge describing course goals as input, and then assists the designer in creating his output courses.

The system thus implants a way of articulating the design and development process, by helping to create a structure which explains why curriculum design and delivery decisions were made. IDE can aid in creating course designs, structuring course content, and creating instructional sequences for standard, as well as adaptive, delivery.

RN 88-12 Human Factors Assessment: M9 Armored Combat Earthmover (ACE), Krohn, G.S. April 1988. (AD A194 262) The human factors assessment for the M9 Armored Combat Earthmover (ACE) was conducted in response to a requirement for a follow-on evaluation (FOE) of the system. The FOE was conducted at Fort Hood, Texas, from March through June 1985, by the Combined Arms Test Activity (TCATA) of the Army Training and Doctrine Command (TRADOC), working for the Army Operational Test and Evaluation Agency (OTEA). Nine M9 ACEs performed construction tasks, and on-site performance observations, structured interviews, and weekly meetings with the operators and mechanics were conducted by human factors engineers. Questionnaires were also filled out by the personnel being tested when the FOE was finished. Measurements included vibration, noise levels, temperature, and humidity. Forty human factors deficiencies and safety hazards were found during the assessment. Many of the deficiencies and hazards can be corrected without major modifications to the vehicle components, and using existing hardware.

RN 88-13 Literature Review: Validity and Potential Usefulness of Psychomotor Ability Tests for Personnel Selection and Classification, McHenry, J.J.; Rose, S.R. April 1988. (AD A193 558) The psychomotor ability literature was reviewed to determine the validity and potential usefulness of psychomotor ability tests for personnel selection and classification. Over 2,200 psychomotor test validity coefficients were located. These were tabulated by ability (using Fleishman's psychomotor ability taxonomy), criterion (e.g., school vs. training vs. job performance), and job type. Analyses of these data showed that psychomotor tests had been used successfully to predict training and job performance (i.e., $r_{xy} > .20$) for many different occupations. Barriers to the use of psychomotor tests were also investigated. Reliability data indicate that psychomotor measures are not unstable. Moreover, the possibility of using computerized tests in the future to assess psychomotor abilities should eradicate the problem of apparatus differences which has historically plagued psychomotor testing. Data on the intercorrelations between psychomotor and cognitive-perceptual tests showed that there may be some overlap between spatial and mechanical ability tests and many psychomotor ability tests, but that this overlap is not great ($.20 < r < .30$). The data also indicated that psychomotor abilities are almost totally uncorrelated with tests of general ability, g. Data on group differences were sparse, but suggested that group differences for psychomotor ability tests are generally less than those for cognitive-perceptual ability tests. Taken together, these findings suggest a need for further psychomotor test development and validation research. A suggested priority for such research is provided.

RN 88-14 Review of Eight Army Systems: Characteristics and Implications for Embedded Training, Strasel, H.C.; Dyer, F.N.; Aldrich, R.E.; Burroughs, S.L. April 1988. (AD A195 484) This research note reviews eight Army systems and attempts to relate their system characteristics to the opportunities and requirements for development of em-

bedded training (ET) in current and future Army systems. This is an early step in a major Army Research Institute program to develop formal and systematic procedures (to be included in the LCMM acquisition process) to identify ET needs, to determine how and when ET should be included, and to define the procedures which will assist systems and training developers in the implementation of ET in their systems. Characteristics of the following eight Army systems were reviewed: four fielded systems (Apache AH64A, Bradley M2, Patriot ADA System, and TACFIRE [an FA tactical fire direction system], and four systems in development (AFTADS [the successor system to TACFIRE], ASAS I/EW ADP System, aquila RPV, and the HIP [Howitzer Improvement Program]. Characteristics of the systems which were reviewed included: system-mission-equipment; personnel and operator-maintainer tasks; computational capability; simulation capability; training [both institutional and unit training, with an emphasis on ET where it does or could exist]; feedback and assessment of performance; availability of system and personnel for training; training problems; and training costs. (Little data on costs, and essentially no data on cost effectiveness were collected, although the questions are considered in the report.)

The analysis was directed toward derivation of implications for the development of the implementation procedures and guidelines mentioned above. The discussion and conclusions provide directions for such guidelines, as well as some specific guidelines.

RN 88-15 Appendixes to ARI Technical Report 717: Development and Field Test of Task-Based MOS-Specific Criterion Measures, Volume 1, Campbell, C.H.; Campbell, R.C.; Rumsey, M.G.; Edwards, D.C. April 1988. (AD A195 908) The materials presented in this series of research notes were prepared as part of Project A, the Army's current large-scale manpower and personnel effort to improve the selection, classification, and utilization of Army enlisted personnel. This portion of the Project A research dealt with the development and field tryout of task-based MOS-specific knowledge tests, hand-on tests, task performance ratings, and job experience questionnaires for nine Military Occupational Specialties (MOS), and is reported in ARI Technical Report 717. Job Performance domains were derived from Army Occupational Survey Programs (AOSP) results, Soldier's Manuals, and Proponent Agency input. Subject matter expert judgements of task criticality, difficulty, and similarity were used to select tasks for test development. All tests were pilot-tested on Skill Level 1 soldiers and noncommissioned officers. Field tests were conducted among 114-178 soldiers per MOS. Results were used to revise the instruments and to provide evidence of reliability and validity. Proponent agencies provided technical reviews before the field tests and after the instruments were revised. Hands-on and knowledge tests exhibited reasonable performance variability, as did the rating scales. Correlations between the two test methods were high, but do not suggest that either should substitute for the other. Rating scales correlated more highly among themselves than with the tests, as would be expected from their surface dissimilarity and affective focus. Job experience emerged as a potentially important factor in explaining performance variability. The instruments were finalized for the upcoming Concurrent Validation, where they will serve as criterion measures for a new predictor battery designed to supplement the Armed Services Vocational Aptitude Battery (ASVAB). ARI Technical Report 717, *Development and Field Test of Task-Based MOS-Specific Criterion Measures*, describes the development and field test of the measures discussed above. This volume presents the following appendixes to that report:

Research Notes

Appendix A: Descriptions of Nine MOS (From AR 611-201, Enlisted Career Management Fields and Military Occupational
 Specialties)
Appendix B: Domain list of Soldier's Manual Tasks and AOSP Task Statements of Nine MOS
Appendix C: Domain List of Tasks (Refined) and Results of Subject Matter Expert Judgments for Nine MOS
Appendix D: Materials for Subject Matter Expert Judgments
Appendix E: Instructions for Task Selection
Other appendixes to Technical Report 717 are presented in nine separate volumes. Distribution of these volumes, with the exception of this volume and Volume 6 of this series, is limited.

RN 88-16 Appendixes to ARI Technical Report 717: Development and Field Test of Task-Based MOS-Specific Criterion Measures, Volume 2, Campbell, C.H.; Campbell, R.C.; Rumsey, M.G.; Edwards, D.C. April 1988. (AD B128 612L) The materials presented in this series of research notes were prepared as part of Project A, the Army's current large-scale manpower and personnel effort to improve the selection, classification, and utilization of Army enlisted personnel. This portion of the Project A tests, hand-on tests, task performance ratings, and job experience questionnaires for nine Military Occupational Specialties (MOS), and is reported in ARI Technical Report 717. Job Performance domains were derived from Army Occupational Survey Programs (AOSP) results, Soldier's Manuals, and Proponent Agency input. Subject matter expert judgments of task tests were pilot-tested on Skill Level 1 soldiers and noncommissioned officers. Field tests were conducted among 114-178 soldiers per MOS. Results were used to revise the instruments and to provide evidence of reliability and validity. Proponent agencies provided technical reviews before the field tests and after the instruments were revised. Hands-on and knowledge tests exhibited reasonable performance variability, as did the rating scales. Correlations between the two test methods were high, but do not suggest that either should substitute for the other. Rating scales correlated more highly among themselves than with the tests, as would be expected from their surface dissimilarity and affective focus. Job experience emerged as a potentially important factor in explaining performance variability. The instruments were finalized for the upcoming Concurrent Validation, where they will serve as criterion measures for a new predictor battery designed to supplement the Armed Services Vocational Aptitude Battery (ASVAB). ARI Technical Report 717, *Development and Field Test of Task-Based MOS-Specific Criterion Measures*, describes the development and field test of the measures discussed above. This volume presents the following appendixes to that report:
Appendix F: Tasks Selected for Test Development for Nine MOS
Appendix G: Hands-On Tests Developed for Field Testing for Nine MOS (Part 1)
Other appendixes to Technical Report 717 are presented in nine separate volumes. All volumes in this series, with the exception of Volumes 1 and 6, have limited distribution. Part 2 of Appendix G can be found in Volume 3 of this series.

RN 88-17 The Army Communications Objectives Measurement System (ACOMS): "Tour of Duty" Viewing Patterns, Greenlees, J.B. August 1988. (AD A199 497) This report summarizes analyses conducted on patterns of watching the television show "Tour of Duty" among respondents to the Army Communications Objectives Measurement System (ACOMS) survey who were interviewed in the fifth quarter of data collection (October-Decem-

ber 1987). Analyses were conducted both and all respondents asked questions on their media habits and on those who watched more than the average number of hours of television per week. Differences between respondents who did and did not watch the program were assessed by market segment, related behaviors, and importance of Army attributes. The ACOMS survey was a multiyear telephone survey of a nationally representative sample of 16- to 24-year-old American youth and their parents. The survey was designed to track changes in perceptions, attitudes, and behaviors relevant to Army advertising. Data was collected continuously through the year, using computer-assisted-telephone-interviewing (CATI) technology. Random digit dialing (RDD), involving a modified Waksberg method, was used to identify eligible respondents. The 30-minute interview asked youth about their responses to Army advertising, media habits, career plans, and various demographic characteristics. Other related reports are identified as follows:

Technical Reports (TR) 784, 785, and 787

Research Report (RR) 1473

Research Products (RP) 88-04, 88-05, 88-06, 88-07, and 88-08

Research Note (RN) 88-18.

RN 88-18 The Army Communications Objectives Measurement System (ACOMS): Codebook for the Message Content Analysis Data File, Westat, Inc. July 1988. (AD A199 256) This report documents the data file from the Message Content Analysis survey, a component of the Army Communications Objectives Measurement System (ACOMS). The description of the data file and the same job control language necessary to access the file on the National Institutes of Health computer are provided. The codebook for the data file and the two questionnaires used in the survey are also provided. The Message Content Analysis surveyed a sample of 16- to 24-year-old males and females who viewed 1 of 13 video or 11 print Active Army advertisements. Variables include demographic characteristics of respondents, unaided and aided intention to join the Army, recall of ad sponsorship, main message, and rating of message attributes. The design, methodology, results, and conclusions of the study are reported in *The Message Content of Advertisements for Active Army Enlistments* (Baxter & Gay, 1988). Other related reports are identified as follows:

Technical Reports (TR) 784, 785, 786, and 787

Research Report (RR) 1473

Research Products (RP) 88-04, 88-05, 88-06, 88-07, and 88-08

Research Note (RN) 88-17.

RN 88-19 Appendixes to ARI Technical Report 717: Development and Field Test of Task-Based MOS-Specific Criterion Measures, Volume 3, Campbell, C.H.; Campbell, R.C.; Rumsey, M.G.; Edwards, D.C. April 1988. (AD B128 613L) The materials presented in this series of research notes were prepared as part of Project A, the Army's current large-scale manpower and personnel effort to improve the selection, classification, and utilization of Army enlisted personnel. This portion of the Project A research dealt with the development and field tryout of task-based MOS-specific knowledge tests, hand-on tests, task performance ratings, and job experience questionnaires for nine Military Occupational Specialties (MOS), and is reported in ARI Technical Report 717. Job Performance domains were derived from Army Occupational Survey Programs (ASOP) results, Soldier's Manuals, and Proponent Agency input. Subject matter expert judgments of task criticality, difficulty, and

similarity were used to select tasks for test development. All tests were pilot-tested on Skill Level 1 soldiers and noncommissioned officers. Field tests were conducted among 114-178 soldiers per MOS. Results were used to revise the instruments and to provide evidence of reliability and validity. Proponent agencies provided technical reviews before the field tests and after the instruments were revised. Hands-on and knowledge tests exhibited reasonable performance variability, as did the rating scales. Correlations between the two test methods were high, but do not suggest that either should substitute for the other. Rating scales correlated more highly among themselves than with the tests, as would be expected from their surface dissimilarity and affective focus. Job experience emerged as a potentially important factor in explaining performance variability. The instruments were finalized for the upcoming Concurrent Validation, where they will serve as criterion measures for a new predictor battery designed to supplement the Armed Services Vocational Aptitude Battery (ASVAB). ARI Technical Report 717, *Development and Field Test of Task-Based MOS-Specific Criterion Measures*, describes the development and field test of the measures discussed above. This report presents Part 2 of Appendix G to that report, Hands-On Tests Developed for Field Testing for Nine MOS. Other appendixes to Technical Report 717 are presented in nine separate volumes. Part 1 of Appendix G is presented in Volume 2 of this series.

RN 88-20 Appendixes to ARI Technical Report 717: Development and Field Test of Task-Based MOS-Specific Criterion Measures, Volume 4, Campbell, C.H.; Campbell, R.C.; Rumsey, M.G.; Edwards, D.C. April 1988. (AD B128 614L) The materials presented in this series of research notes were prepared as part of Project A, the Army's current large-scale manpower and personnel effort to improve the selection, classification, and utilization of Army enlisted personnel. This portion of the Project A research dealt with the development and field tryout of task-based MOS-specific knowledge tests, hand-on tests, task performance ratings, and job experience questionnaires for nine Military Occupational Specialties (MOS), and is reported in ARI Technical Report 717. Job Performance domains were derived from Army Occupational Survey Programs (AOSP) results, Soldier's Manuals, and Proponent Agency input. Subject matter expert judgments of task tests were pilot-tested on Skill Level 1 soldiers and noncommissioned officers. Field tests were conducted among 114-178 soldiers per MOS. Results were used to revise the instruments and to provide evidence of reliability and validity. Proponent agencies provided technical reviews before the field tests and after the instruments were revised. Hands-on and knowledge tests exhibited reasonable performance variability, as did the rating scales. Correlations between the two test methods were high, but do not suggest that either should substitute for the other. Rating scales correlated more highly among themselves than with the tests, as would be expected from their surface dissimilarity and affective focus. Job experience emerged as a potentially important factor in explaining performance variability. The instruments were finalized for the upcoming Concurrent Validation, where they will serve as criterion measures for a new predictor battery designed to supplement the Armed Services Vocational Aptitude Battery (ASVAB). ARI Technical Report 717, *Development and Field Test of Task-Based MOS-Specific Criterion Measures*, describes the development and field test of the measures discussed above. This report presents Part 1 of Appendix H to that report, Knowledge Tests Developed for Field Testing for Nine MOS. Other appendixes to Technical Report 717 are presented in nine separate volumes. Distribution of these volumes, with the exception of Volumes 1 and 6 of this series, is limited. Part 2 of Appendix H is presented in Volume 5 of this series.

RN 88-21 Appendixes to ARI Technical Report 717: Development and Field Test of Task-Based MOS-Specific Criterion Measures, Volume 5, Campbell, C.H.; Campbell, R.C.; Rumsey, M.G.; Edwards, D.C. April 1988. (AD B128 615B) The materials presented in this series of research notes were prepared as part of Project A of the Army's current large-scale manpower and personnel effort to improve the Selection, Classification, and utilization of Army enlisted personnel. This portion of the Project A research dealt with the development and field tryout of task-based MOS-specific knowledge tests, hand-on tests, task performance ratings, and job experience questionnaires for nine Military Occupational Specialties (MOS), and is reported in ARI Technical Report 717. Job Performance domains were derived from Army Occupational Survey Programs (AOSP) results, Soldier's Manuals, and Proponent Agency input. Subject matter expert judgments of task criticality, difficulty, and similarity were used to select tasks for test development. All tests were pilot-tested on Skill Level 1 soldiers and noncommissioned officers. Field tests were conducted among 114-178 soldiers per MOS. Results were used to revise the instruments and to provide evidence of reliability and validity. Proponent agencies provided technical reviews before the field tests and after the instruments were revised. Hands-on and knowledge tests exhibited reasonable performance variability, as did the rating scales. Correlations between the two test methods were high, but do not suggest that either should substitute for the other. Rating scales correlated more highly among themselves than with the tests, as would be expected from their surface dissimilarity and affective focus. Job experience emerged as a potentially important factor in explaining performance variability. The instruments were finalized for the upcoming Concurrent Validation, where they will serve as criterion measures for a new predictor battery designed to supplement the Armed Services Vocational Aptitude Battery (ASVAB). ARI Technical Report 717, *Development and Field Test of Task-Based MOS-Specific Criterion Measures*, describes the development and field test of the measures discussed above. This volume presents the following appendixes to that report:

Appendix H: Knowledge Tests Developed for Field Testing for Nine MOS (Part 2)

Appendix I: Sample Rating Form for Job Task Performance

Appendix J: Sample Job History Questionnaire

Other appendixes to Technical Report 717 are presented in nine separate volumes. Distribution of these volumes, with the exception of Volumes 1 and 6 of this series, is limited. Part 1 of Appendix H is presented in Volume 4 of this series.

RN 88-22 Appendixes to ARI Technical Report 717: Development and Field Test of Task-Based MOS-Specific Criterion Measures, Volume 6, Campbell, C.H.; Campbell, R.C.; Rumsey, M.G.; Edwards, D.C. April 1988. (AD A202 836) The materials presented in this series of research notes were prepared as part of Project A, the Army's current large-scale manpower and personnel effort to improve the selection, classification, and utilization of Army enlisted personnel. This portion of the Project A research dealt with the development and field tryout of task-based MOS-specific knowledge tests, hand-on tests, task performance ratings, and job experience questionnaires for nine Military Occupational Specialties (MOS), and is reported in ARI Technical Report 717. Job Performance domains were derived from Army Occupational Survey Programs (AOSP) results, Soldier's Manuals, and Proponent Agency input. Subject matter expert judgments of task criticality, difficulty, and similarity were used to select tasks for test development. All tests were pilot-tested on Skill Level 1 soldiers and noncommissioned officers. Field tests were conducted among 114-178

soldiers per MOS. Results were used to revise the instruments and to provide evidence of reliability and validity. Proponent agencies provided technical reviews before the field tests and after the instruments were revised. Hands-on and knowledge tests exhibited reasonable performance variability, as did the rating scales. Correlations between the two test methods were high, but do not suggest that either should substitute for the other. Rating scales do not suggest that either should substitute for the other. Rating scales correlated more highly among themselves than with the tests, as would be expected from their surface dissimilarity and affective focus. Job experience emerged as a potentially important factor in explaining performance variability. The instruments were finalized for the upcoming Concurrent Validation, where they will serve as criterion measures for a new predictor battery designed to supplement the Armed Services Vocational Aptitude Battery (ASVAB). ARI Technical Report 717, *Development and Field Test of Task-Based MOS-Specific Criterion Measures*, describes the development and field test of the measures discussed above. This volume presents the following appendixes to that report:

Appendix H: Knowledge Tests Developed for Field Testing for Nine MOS (Part 2)
Appendix I: Sample Rating Form for Job Task Performance
Appendix J: Sample Job History Questionnaire

Other appendixes to Technical Report 717 are presented in nine separate volumes. Distribution of these volumes, with the exception of Volumes 1 and 6 of this series, is limited. art 1 of Appendix H is presented in Volume 4 of this series.

RN 88-23 Appendixes to ARI Technical Report 717: Development and Field Test of Task-Based MOS-Specific Criterion Measures, Volume 7, Campbell, C.H.; Campbell, R.C.; Rumsey, M.G.; Edwards, D.C. April 1988. (AD B128 616L) The materials presented in this series of research notes were prepared as part of Project A, the Army's current large-scale manpower and personnel effort to improve the selection, classification, and utilization of Army enlisted personnel. This portion of the Project A research dealt with the development and field tryout of task-based MOS-specific knowledge tests, hand-on tests, task performance ratings, and job experience questionnaires for nine Military Occupational Specialties (MOS), and is reported in ARI Technical Report 717. Job Performance domains were derived from Army Occupational Survey Programs (AOSP) results, Soldier's Manuals, and Proponent Agency input. Subject matter expert judgments of task tests were pilot-tested on Skill Level 1 soldiers and noncommissioned officers. Field tests were conducted among 114-178 soldiers per MOS. Results were used to revise the instruments and to provide evidence of reliability and validity. Proponent agencies provided technical reviews before the field tests and after the instruments were revised. Hands-on and knowledge tests exhibited reasonable performance variability, as did the rating scales. Correlations between the two test methods were high, but do not suggest that either should substitute for the other. Rating scales correlated more highly among themselves than with the tests, as would be expected from their surface dissimilarity and affective focus. Job experience emerged as a potentially important factor in explaining performance variability. The instruments were finalized for the upcoming Concurrent Validation, where they will serve as criterion measures for a new predictor battery designed to supplement the Armed Services Vocational Aptitude Battery (ASVAB). ARI Technical Report 717, *Development and Field Test of Task-Based MOS-Specific Criterion Measures*, describes the development and field tests of the measures discussed above. This volume presents the following appendixes to that report: P,Q,R,S,T,U, and Part 1 of Appendix

V. Other appendixes to Technical Report 717 are presented in nine separate volumes. Distribution of these volumes, with the exception of Volumes 1 and 6 of this series, is limited.
Part 2 of Appendix V is presented in Volume 8 (ARI Research Note 88-24)
Part 3 of Appendix V is presented in Volume 9 (ARI Research Note 88-25)
Part 4 of Appendix V is presented in Volume 10 (ARI Research Note 88-26).

RN 88-24 Appendixes to ARI Technical Report 717: Development and Field Test of Task-Based MOS-Specific Criterion Measures, Volume 8, Campbell, C.H.; Campbell, R.C.; Rumsey, M.G.; Edwards, D.C. April 1988. (AD B131 575) The materials presented in this series of research notes were prepared as part of Project A, the Army's current large-scale manpower and personnel effort to improve the selection, classification, and utilization of Army enlisted personnel. This portion of the Project A research dealt with the development and field tryout of task-based MOS-specific knowledge tests, hand-on tests, task performance ratings, and job experience questionnaires for nine Military Occupational Specialties (MOS), and is reported in ARI Technical Report 717. Job Performance domains were derived from Army Occupational Survey Programs (AOSP) results, Soldier's Manuals, and Proponent Agency input. Subject matter expert judgments of task tests were pilot-tested on Skill Level 1 soldiers and noncommissioned officers. Field tests were conducted among 114-178 soldiers per MOS. Results were used to revise the instruments and to provide evidence of reliability and validity. Proponent agencies provided technical reviews before the field tests and after the instruments were revised. Hands-on and knowledge tests exhibited reasonable performance variability, as did the rating scales. Correlations between the two test methods were high, but do not suggest that either should substitute for the other. Rating scales correlated more highly among themselves than with the tests, as would be expected from their surface dissimilarity and affective focus. Job experience emerged as a potentially important factor in explaining performance variability. The instruments were finalized for the upcoming Concurrent Validation, where they will serve as criterion measures for a new predictor battery designed to supplement the Armed Services Vocational Aptitude Battery (ASVAB). ARI Technical Report 717, *Development and Field Test of Task-Based MOS-Specific Criterion Measures*, describes the development and field test of the measures discussed above. This volume presents Part 2 of Appendix V to that report, Hands-On and Knowledge Tests for Concurrent Validation for Nine MOS. Other appendixes to Technical Report 717 are presented in nine separate volumes. Distribution of these volumes, with the exception of Volumes 1 and 6 of this series, is limited. Part 1 of Appendix V is presented in Volume 7 of this series; Parts 3 and 4 can be found in Volumes 9 and 10.

RN 88-25 Appendixes to ARI Technical Report 717: Development and Field Test of Task-Based MOS-Specific Criterion Measures, Volume 9, Campbell, C.H.; Campbell, R.C.; Rumsey, M.G.; Edwards, D.C. April 1988. (AD B128 622L) The materials presented in this series of research notes were prepared as part of Project A, the Army's current large-scale manpower and personnel effort to improve the selection, classification, and utilization of Army enlisted personnel. This portion of the Project A research dealt with the development and field tryout of task-based MOS-specific knowledge tests, hand-on tests, task performance ratings, and job experience questionnaires for nine Military Occupational Specialties (MOS), and is reported in ARI Technical Report 717. Job Performance domains were derived from Army Occupational Survey Programs (AOSP) results, Soldier's Manuals, and

Proponent Agency input. Subject matter expert judgments of task criticality, difficulty, and similarity were used to select tasks for test development. All tests were pilot-tested on Skill Level 1 soldiers and noncommissioned officers. Field tests were conducted among 114-178 soldiers per MOS. Results were used to revise the instruments and to provide evidence of reliability and validity. Proponent agencies provided technical reviews before the field tests and after the instruments were revised. Hands-on and knowledge tests exhibited reasonable performance variability, as did the rating scales. Correlations between the two test methods were high, but do not suggest that either should substitute for the other. Rating scales correlated more highly among themselves than with the tests, as would be expected from their surface dissimilarity and affective focus. Job experience emerged as a potentially important factor in explaining performance variability. The instruments were finalized for the upcoming Concurrent Validation, where they will serve as criterion measures for a new predictor battery designed to supplement the Armed Services Vocational Aptitude Battery (ASVAB). ARI Technical Report 717, *Development and Field Test of Task-Based MOS-Specific Criterion Measures*, describes the development and field test of the measures discussed above. This volume presents Part 3 of Appendix V to that report, Hands-On and Knowledge Tests for Concurrent Validation for Nine MOS. Other appendixes to Technical Report 717 are presented in nine separate volumes. Distribution of these volumes, with the exception of Volumes 1 and 6 of this series, is limited.

RN 88-26 Appendixes to ARI Technical Report 717: Development and Field Test of Task-Based MOS-Specific Criterion Measures, Volume 10, Campbell, C.H.; Campbell, R.C.; Rumsey, M.G.; Edwards, D.C. April 1988. (AD B128 811L) The materials presented in this series of research notes were prepared as part of Project A, the Army's current large-scale manpower and personnel effort to improve the selection, classification, and utilization of Army enlisted personnel. This portion of the Project A research dealt with the development and field tryout of task-based MOS-specific knowledge tests, hand-on tests, task performance ratings, and job experience questionnaires for nine Military Occupational Specialties (MOS), and is reported in ARI Technical Report 717. Job Performance domains were derived from Army Occupational Survey Programs (AOSP) results, Soldier's Manuals, and Proponent Agency input. Subject matter expert judgments of tasks criticality, difficulty, and similarity were used to select tasks for test development. All tests were pilot-tested on Skill Level 1 soldiers and noncommissioned officers. Field tests were conducted among 114-178 soldiers per MOS. Results were used to revise the instruments and to provide evidence of reliability and validity. Proponent agencies provided technical reviews before the field tests and after the instruments were revised. Hands-on and knowledge tests exhibited reasonable performance variability, as did the rating scales. Correlations between the two test methods were high, but do not suggest that either should substitute for the other. Rating scales correlated more highly among themselves than with the tests, as would be expected from their surface dissimilarity and affective focus. Job experience emerged as a potentially important factor in explaining performance variability. The instruments were finalized for the upcoming Concurrent Validation, where they will serve as criterion measures for a new predictor battery designed to supplement the Armed Services Vocational Aptitude Battery (ASVAB). ARI Technical Report 717, *Development and Field Test of Task-Based MOS-Specific Criterion Measures*, describes the development and field test of the measures discussed above. This volume presents Part 4 of Appendix V to that report, Hands-On and Knowledge Tests for

Concurrent Validation for Nine MOS. Other appendixes to Technical Report 717 are presented in nine separate volumes. Distribution of these volumes, with the exception of Volumes 1 and 6 of this series, is limited. Parts 1-3 of Appendix V are presented in Volumes 7-9 of this series.

RN 88-27 The Effectiveness of a Rater Training Booklet in Increasing Accuracy of Performance Ratings, Garlinger, D.K. April 1988. (AD A194 723) This research note examines the possibility of increasing the accuracy of performance ratings through the use of an instruction booklet to train raters. The booklet focussed on the cognitive processes of raters which can lead to faulty conclusions, bias, and misperceptions, with the goal of increasing the objectivity and fairness of observations and ratings. The research utilized a between-groups "post test only" design. Consensus of opinion among subject matter experts provided the "true score" against which the subjects' ratings were compared for accuracy. The dependent measure was the absolute deviation score of each individual's rating from the "true score". The results indicated no significant group differences in accuracy. This finding is discussed, and suggestions for further research are given.

RN 88-28 The Assignment of Knowledge Test Items to Functional and Cognitive Categories, Kuhn, D.B. April 1988. (AD A196 156) The research described in this note was conducted as part of Task 3 of Project A: Improving the Selection, Classification, and Utilization of Army Enlisted Personnel. Task 3 is specifically concerned with the development of training performance tests. This report describes the procedures used for assigning test items to functional and cognitive categories as a means of determining the part of the criterion space occupied by the test items.

RN 88-29 Extended Database on Minorities and Women in Science, Engineering, and Technology, Kay, N.W. April 1988. (AD A197 200) The database discussed in this research note was designed to be used as a resource for research concerned with the education and careers of minorities and women in quantitative fields. The 1,239 documents covered include 785 empirical studies. The range of the literature is ninth grade through Ph.D level, and the minority groups discussed are American Indians, Asian Americans, Blacks, Hispanics, and women. Topics covered are the physical sciences, engineering, mathematics, computer sciences, biotechnology, and environmental sciences. The database that has been set up is multidisciplinary, containing references on all subgroups of interest, and presenting a variety of methodological viewpoints and statistical treatments.
The database was developed using INMAGIC software, and can be accessed through key words, including: author, title, date, retention, recruitment, counseling, etc. At present, access is only possible using INMAGIC software, and the research note describes how to access the database through INMAGIC.

RN 88-30 Selection and Effects of Channels in Distributed Communication and Decision-Making Tasks: A Theoretical Review and a Proposed Research Paradigm, Reder, S.; Conklin, N.F. April 1988. (AD A193 015) This research note examines relationships between the communication patterns of decision groups and the nature and outcomes of their decision processes. It looks at the selection of particular channels and channel effects in particular. A review of research indicates that no satisfactory theoretical framework has yet been developed that accounts for the often strategic and tactical nature of communica-

tion channel selection. An initial theory is outlined, establishing quantifiable relationships among causally linked sets of variables: characteristics of the decision group, characteristics of the decision task, channel selections made by the group, structural and content characteristics of the messages produced, decisions reached, and perceived characteristics of the decision process.

RN 88-31 Predicted Effect of Projectile Dispersion on Target Hit Probabilities and Dispersion-Zone Sizes for the 25-mm Gun of the Bradley Fighting Vehicle, Perkins, M.S. April 1988. (AD A193 618) This research note presents the mathematical analysis used to predict the effect of varied levels of projectile dispersion on a) dispersion-zone size, and b) hit probabilities for targets engaged with the 25-MM gun of the Bradley Fighting Vehicle. This provides critical background information on issues such as accuracy criteria for zeroing, maximum effective engagement ranges, and the training aids used to illustrate the effects of dispersion.

RN 88-32 Development of Aiming Rules for the 25-mm Gun of the Bradley Fighting Vehicle, Perkins, M. S. April 1988. (AD A197 246) This research note describes the development of aiming rules to optimize the first-round accuracy of the 25-MM gun when it is used to engage moving vehicles from a stationary Bradley Fighting Vehicle (lead rule) and to engage stationary targets from a moving vehicle (reverse-lead rule). Selection of rules was based on predicted target hit capabilities, and ease of use and training. Rules were expressed as simple words which described the relationship of the target to the sight reticle. Developing aiming rules will replace previous rules presented in the Bradley Fighting Vehicle Gunnery Field Manual, FM 23-1.

RN 88-33 An Assessment of Training Needs of the U.S. Army Reserve and National Guard in Idaho, Viner, M.P.; Moore, H.G.; Eisley, M.E.; Hart, R.J. April 1988. (AD A207 125) This research note identifies the training needs of the Idaho National Guard and Idaho Reserve Units (the Reserve Component RC), and recommends potential solutions to the problem discussed. Needs were identified through a written survey administered to Idaho RC soldiers, and through observing soldier performance during Active and Inactive Duty Training. Recommended solutions were derived from information obtained in follow-up interviews conducted with junior enlisted soldiers, noncommissioned officers, and officers.

RN 88-34 Target Acquisition and Analysis Training System: An Exploratory Investigation of Vehicle Identification Performance With Black Hot and White Hot Thermal Images, Heuckeroth, O.H; Smith, N.D.; Warnick, W.L. May 1988. (AD A195 725) This research note reports on research whose major objectives were to determine: 1) how overall identification performance differs between slides of black hot and white hot thermal vehicle images, and 2) how identification performance is affected by whether the images shown at various ranges are black hot or white hot. The primary conclusions drawn from the data analyses included these: The black hot thermal polarity setting is preferred for target identification by the majority of soldiers who are competent in vehicle recognition and identification using thermal sights. Although an average of absolute differences between performance using black hot and white hot images favored the use of black hot images across all ranges, these results are inconclusive. Further research is suggested. Identification performance using

thermal images degrades sharply at intermediate (1300-1700 meter) and far (1800-2300 meter) ranges.

RN 88-35 Training Effectiveness and Cost Iterative Technique (TECIT) Volume I: Training Effectiveness Analysis, Goldberg, I. April 1988. (AD A196 727) This research note describes the effectiveness model of the Training Effectiveness and Cost Iterative Technique (TECIT), a new model concerned with the cost effectiveness of training devices and simulators (TD/A) at all phases of the life cycle development. Volume II describes the cost model. For the purposes of this study, the effectiveness of a training device or simulator was defined as a function of the following factors: safety, acquisition learning on the TD/S, transfer of training from the TD/S to an exercise on the weapon system during training, job or battle readiness, and the utilization ratio of the TD/S. A research strategy is outlined in the research note. This strategy considers cross-sectional and longitudinal designs, TD/A life cycle phases, and various validity designs (e.g. discriminant, concurrent, and predictive validity). Sampling of subject matter experts' opinions and TD/S is also considered. Also included in this document is a review of related models, including the Device Effectiveness Forecasting Technique (DEFT), Forecasting Training Effectiveness (FORTE), and Comparison Based Prediction (CBP). A comparison of model features is also included, along with sample questionnaires, and an illustrative data base.

RN 88-36 Improving the Selection, Classification, and Utilization of Army Enlisted Personnel: Annual Report, 1986 Fiscal Year. Supplement to ARI Technical Report 792, Campbell, J.P. May 1988. (AD A196 274) The information presented in this research note was prepared under Project A, the Army's current, large-scale manpower and personnel effort to improve the selection, classification, and utilization of Army enlisted personnel. This note supplements ARI Technical Report 692, the Annual Report for the Project's 1986 fiscal year. It augments the technical report by providing copies of a set of technical papers prepared during the fiscal year which discuss detailed phases of the project's research methods and results.

RN 88-37 Selection and Assessment of Special Forces Qualification Course Candidates: Preliminary Issues, Pleban, R.J.; Thompson, T.J.; Valentine, P.J.; Dewey, G.I.; Allentoff, H.L.; Wesolowski, M.A. April 1988. (AD A196 245) This research note seeks to provide a preliminary assessment of current methods of screening candidates for entry into the Special Forces Qualification Course (SFQC), and to examine the potential utility of alternative selection approaches. While the criteria for entry into the SFQC are extensive, they focus more on administrative issues and general training experience than on the qualities needed for success in the course, or on an operational detachment. No specialized selection program or battery is currently being used.

RN 88-38 Use of a Working Model in Fault Diagnosis, Allison, K.R. January 1988. (AD A195 621) Many types of knowledge are required for effective reasoning in the diagnostic domain In particular, knowledge about the normal functioning of a system is essential in order to troubleshoot the system. In this research note, we define a working model which represents a troubleshooter's integrated knowledge of system components, to include input, output, structure, function, and causal relationships. Two ways that the working model

can aid in fault diagnosis are in generating hypotheses for subsequent testing and in verifying or explaining faulty behavior. In this paper, we present a representation of an automobile mechanic for the mental working model. The emphasis in this domain is to use the working model to generate new hypotheses, in a manner consistent with the behavior of real mechanics.

RN 88-39 First Year Human Performance Research Activity, Vreuls Research Corp. June 1988. (AD A196 244) This research note describes the first year of work performed by Vreuls Research Corporation while under contract to the Army Research Institute's Fort Leavenworth Field Unit, supporting the Field Unit's effort in assisting the Combined Arms Center (CAC) to improve command and control (C)2 systems. The focus of the research is to improve command and control systems through enhancing human performance on information processing and decision-making tasks. Three research projects are being conducted under the program: Improved Methods for Command Group Training, Advanced Technology for Command Staff Operations, and Evaluating Command Post Performance. Other reports detailing the research and findings, designed and conducted experiments, and necessary literature reviews to support the various tasks accomplished have also been published.

RN 88-40 A Survey of Expert System Development Tools, Liebhaber, M.J.; Riedel, S.L. June 1988. (AD A197 354) This research note is a brief review of ninety-three Expert System Development (ESD) tools identified in the open literature from 1984 to 1987. An ESD tool is one or more computer programs that facilitate the process of building an expert system. Most ESD tools form an integral part of the completed expert system, providing a mechanism for controlling the operations of the system, and a method for interacting with the knowledge base. The purpose of this research note is to guide searches and evaluations of Expert System Development Tools by those responsible for creating expert system.

RN 88-41 Computer Based Intelligence Support: An Integrated Expert System and Decision Support Systems Approach, Sage, A.P.; Lagomasino, A. June 1988. (AD A197 386) This research note summarizes research and design needs in the area of computer based intelligence support, particularly the command and control area. It is argued that an integrating approach is needed. A discussion of knowledge representation emphasizes this, and an approach that accommodates both probabilities and logical support, and which is able to cope with several types of imperfect information is described.

RN 88-42 Structuring Knowledge Retrieval: An Analysis of Decomposed Quantitative Judgements, MacGregor, D.; Lichtenstein, S.; Slovic, P. June 1988. (AD A197 508) Subjects were asked to estimate the answers to sixteen questions concerning uncertain quantities like "How many people are employed by hospitals in the U.S.?" under five different aiding conditions. The most-aided group (Full Algorithm) was given a complete algorithm and asked to make estimates for all the parts of the algorithm and to combine the parts as indicated to arrive at an estimate of the desired quantity. The second group (Partial Algorithm) was given the same algorithm without indications of how to combine the parts. After making estimates of the parts, these subjects then estimated the desired quantity. The third group (List & Estimate) were asked to list components or factors they thought were relevant, make an estimate of each item on their list, and then estimate the desired quantity. The fourth group

(List) were asked to make such a list, but they were not asked to make estimates of each item before making an estimate of the desired quantity. The fifth group received no aid. The results generally shoed improved performance in terms of both accuracy and consistency across subjects with increasing structure of the aid. Generalization of these results to practical estimation situations is possible but limited by the need, in real situations, for the estimator to develop the algorithm, a task that was here done by the experimenters.

RN 88-43 Direct and Indirect Scaling of Membership Functions of Probability Phrases, Rapoport, A.; Wallsten, T.S.; Cox, J.A. June 1988. (AD A197 436) A crucial issue in empirical measurement of membership functions is whether the degree of fuzziness is invariant under different scaling procedures. In this paper a direct and an indirect procedure, (magnitude estimation and graded pair-comparison), are compared in the context of establishing membership functions for probability phrases such as "probable", "rather likely", "very unlikely", and so forth. Analyses at the level of individual respondents indicate (a) membership functions are stable over time, (b) functions for each phrase differ substantially over people, (c) the two procedures yield similarly shaped functions for a given person-phrase combination, (d) the functions from the two procedures differ systematically, in that those obtained directly dominate, or indicate greater fuzziness than do those obtained indirectly, and (e) where the two differ the indirectly obtained function may be the more accurate one. A secondary purpose of the paper is to evaluate the effects of the modifiers "very" and "rather". "Very" has a general intensifying effect that is described by Zadeh's (1972) concentration model for seven subjects and by a shift model for on none. The effects of "rather" are unsystematic and not described by any available model.

RN 88-44 Executive Development in a Military Organization, McCauley, C.D. June 1988. (AD A197 353) The tools developed from qualitative research on executive development in the corporate sector (the Executive Inventory and the Job Challenge Profile) were tested in a military setting. The Executive Inventory (EI) is a rating instrument designed to provide feedback to a manager on his or her strengths and weaknesses. The manager completes the instrument and asks several co-workers (peers, superiors, or subordinates) to complete it on him or her. The Job Challenge Profile (JCP) is designed to measure on-the-job challenges and development. An individual uses the instrument to rate his or her won job. Both instruments can aid in the systematic development of leadership talent: The EI by providing insight into an individual's developmental needs, and the JCP by indicating what on-the-job experiences are most developmental. Some minor wording changes were needed to adapt the instruments for use in a military setting. The EI was then administered to a group of officers attending the Army War College, and the JCP was completed by a group of company commanders. The results indicated some differences between findings in corporate and military settings. The competencies seen as most important to develop differed somewhat in the two settings. Although the ability to lead and develop subordinates and behavioral flexibility were seen as important competencies in both settings, integrity and decisiveness received greater emphasis in the military setting while building lateral and external relationships was emphasized more by corporate managers. Also, the job characteristics associated most strongly with on-the-job learning differed in the two settings. In the company commanders position, the most learning was reported by officers who felt they had supportive bosses, needed to establish their own credibility, and faced downsizing or restructuring

(List) were asked to make such a list, but they were not asked to make estimates of each item before making an estimate of the desired quantity. The fifth group received no aid. The results generally shoed improved performance in terms of both accuracy and consistency across subjects with increasing structure of the aid. Generalization of these results to practical estimation situations is possible but limited by the need, in real situations, for the estimator to develop the algorithm, a task that was here done by the experimenters.

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decisions. Corporate middle managers reported more learning in positions characterized by lack of top management support and high pressures (e.g., visibility, tight deadlines).

RN 88-45 Base Rate Effects on the Interpretation of Probability and Frequency Expressions, Wallsten, T.S.; Fillenbaum, S.; Cox, J.A. June 1988. (AD A198 456) This research note reports on two studies run to determine whether the interpretations of statements, or forecasts, using vague probability and frequency expressions such as "likely", "improbable", "frequently", "rarely" were sensitive to the base rates of the events involved. In the first experiment, professional weather forecasters judged situations drawn from a medical context. In the second, students judged matched forecast scenarios of common semantic content that differed only in prior probability (as determined by an independent group of subjects). Results were as follows: the interpretations of forecasts using neutral terms (e.g. possible) and terms above neutral (e.g. usually) were strong, positive functions of base rate, while the interpretations of forecasts using terms below neutral (e.g. rarely) were much less affected by base rates; in the second experiment, interpretations of forecasts appeared to represent some kind of average of the meaning of the expression and the base rate.

RN 88-46 Decomposition Strategies for Eliciting Expert Knowledge: Judgements of Dangerousness, Lichtenstein, S.; Slovic, P. June 1988. (AD A197 913) This research note discusses one important finding from decision-aiding research, that people often have relevant knowledge that they do not use effectively when making a judgment or decision. Research has shown, however, that simple "holistic" judgments can be improved upon through an approach that breaks up or decomposes the problem into a series of sub-problems, or components, each of which can be understood more easily and judged separately. The components are then assembled according to a logically prescribed set of combination rules to yield a solution, estimate, or prediction. In the present paper, we outline how a decomposition approach may help a large consortium of expert judges to utilize their own knowledge base more effectively, in an extremely difficult and important judgment task (the task examined is assessment of dangerousness among people who have threatened to assassinate the President of the United States).

RN 88-47 Consequences of Individual Differences in Brain Organization for Human Performance, Green, J.; West, P.D.; Hartup, D.C.; Folds, D.F. June 1988. (AD A196 667) This research note summarizes the work done during the first year of a four-year research program to identify how measurement of brain functioning, especially individual differences in brain functioning, can be used to understand and predict human performance in complex human-machine systems. A major objective of the completed work was to define measures which identify characteristics of individual brain functioning. The results suggest that electrophysiological measures have the greatest potential to measure performance-related aspects of brain functioning. Given the sensitivity of the electrophysiological measures to variation in brain functioning, and their potential as measures of workload, it is planned to include further evaluation of these measures in future work, as indices of performance-related aspects of brain functioning.

RN 88-48 Structuring as an Aid to Performance in Base-Rate Problems, Lichtenstein, S.; MacGregor, D. June 1988. (AD A196 837) This research note describes an

experiment in which four groups of college students were each given two base-rate problems. Three of the groups were given an aid with the first problem. The aids were: 1) an instruction to list factors or aspects that were relevant to solving the problem, 2) a fill-in-the-blank algorithm providing the correct solution, and 3) a seven-page tutorial that explained base-rate problems, and showed how to solve them using a 2x2 table. No aid was provided to any of the groups for the second problem. The control group replicated previous findings in disregarding the base-rate information. The "list factors" group showed no improvement in performance over the control group. The "algorithm" group showed distinctly better performance for the first problem, but were the same as the control group for the second problem. The "tutorial" group did best. Forty-two percent of the answers to the first problem, and thirty-one percent of the answers to the second problem were within + .10 of the correct answer. An error analysis identified a conceptual weakness in the tutorial, and a high rate of arithmetic errors was also found. College students appear to lack the knowledge to solve base-rate problems, but they can be taught this skill.

RN 88-49 Codebook for Categorization of Highway Formula Protocols, Hamm, R.M. June 1988. (AD A198 056) This research note reproduces the Coder's Manual for the protocol analysis used to measure "Moment by Moment Variation in Experts' Analytic and Intuitive Cognitive Activity", a study (by Robert Hamm. University of Colorado, Boulder. 1985.) which analyzed the thinking-aloud of highway engineers who were asked to produce a mathematical formula which expresses the dependence of highway safety, carrying capacity, and aesthetic value on a number of appropriate cues. The Coder's Manual defines every category in each of fourteen categorization schemes, and reports the reliability with which each category and scheme was coded.

RN 88-50 User-Computer Interface Technology: An Assessment of the Current State of the Art, Landee-Thompson, S. June 1988. (AD A196 839) There is an obvious challenge for those doing research and development work in user-computer interaction to identify and track research developments from a wide range of related fields. This assessment of relevant literature is intended to extend the user-computer R&D community's appreciation for some of the current trends, directions, accomplishments and challenges in developing intelligent interactive system interfaces. The basic document consists of an assessment of the state-of-the-art based upon the analysis of 39 representative recent publications. These are analyzed in terms of defining the problem, recent developments toward intelligent interfacing and difficulties in developing intelligent interfaces. Conclusions and suggestions are offered concerning promising areas for research and development. The document also contains an annotated bibliography in which the contents of 57 recent publications relevant to user-computer interface technology are summarized. This document will prove useful to anyone seeking a definition and synopsis of the state-of-the-art in intelligent user-computer interface technology.

RN 88-51 Determining and Testing Factors Impacting Upon the Supply of Minority and Women Scientists, Engineers, and Technologists for Defense Industries and Installations. Phase 1 Final Report, Kay, N.W. June 1988. (AD A200 272) This research note addresses projected U.S. demographic trends, which forecast a continuing shrinkage of the 18 to 24 year old population, and a continuing increase of the percentage of

minorities in the total population. This poses a problem not simply for military recruitment, but for the ensuring of a sufficient supply of scientists, engineers, and technologists (SETs) for the U.S. defense industry. This research note's preparation included an intensive and extensive literature search, and the prioritization of the references into categories. This was followed by conducting interviews to validate the factors which the literature search showed to be influential. Phase I of the project has produced a computerized database of 682 references related to the subject of women and minorities in SET studies and careers (including mathematics and computer science) and to the determination of the factors which previous researchers have found to affect the decisions of women and minority members to pursue SET careers. In addition, successful intervention programs have been targeted for some populations.

RN 88-52 Explanations of the Use of Reliability Information as the Response in Probabilistic Inference Word Problems, Hamm, R.M. June 1988. (AD A197 060) This research note examines probabilistic word problems. Such problems (for example, the Blue/Green Cab Problem) require the subjects to state the probability of a hypothesis [H], when they are given information about the base rate [p(H)], evidence [E], and the reliability of the evidence [thus the formula p(E/H) with p(H/E), and that they interpolate between the base rate probability and 1.0, but select their response from among nearby numbers which are available in the word problem.

RN 88-53 Enhancing Performance Under Stress by Information About Its Expected Duration, Breznitz, S. June 1988. (AD A196 836) This research note discusses experiments in which four groups of subjects were given two stressful tasks; the Dynamometer test, and the Cold Pressor test. At the same time, the test subjects were given different information about the tests' duration. The information conditions were: no information, exact information, false long (with subsequent encouraging correction), and false short (with subsequent discouraging correction). Endurance was highest with the exact information condition, lowest in the no information condition, and the other two groups produced intermediate results. Timing of the maximal heart rate during the task was systematically related to information, and its role as a potential indicator of psychological "breakdown" was analyzed.

RN 88-54 Automatic Concept Formation in a Rich Input Domain, Lebowitz, M. June 1988. (AD A196 719) Learning by observation involves the creation of categories summarizing experience. In this research note, we summarize our research during the contact period with UNIMEM, an Artificial Intelligence system that learns by observation. UNIMEM is a robust program that can be run on many domains with real-world problem characteristics, such as uncertainty, incompleteness, and large numbers of examples. We give an overview of the program that illustrates UNIMEM's key elements, including the automatic creation of non-disjoint concept hierarchies that are evaluated over time. We then describe several experiments that we have carried out with UNIMEM, testing it on different domains (universities, Congressional voting records, and terrorist events), and an examination of the effect of varying UNIMEM's parameters on the resulting concept hierarchies. Finally, we discuss future directions for our work with the program.

RN 88-55 Potential Predictors of Target Acquisition Performance by Gunners: A Literature Review, Kubala, A.L. June 1988. (AD A198 183) For this research note, a review of the literature was conducted to determine the feasibility of selecting and/or training gunners for target acquisition skills. Of particular interest was literature which might pertain to the Advanced Antiarmor Weapons System Medium (AAWS-M). It was recommended that any trial selection battery should include measures of visual acuity, color vision, contrast sensitivity, dark focus, peripheral vision and perceptual style. It was concluded that training was essential for developing identification skills, and would probably improve detection skills, as well.

RN 88-56 Measuring the Vague Meanings of Probability Terms, Wallsten, T.S.; Budescu, D.V.; Rappaport, A.; Zwick, R.; Forsyth, B. July 1988. (AD A196 944) In two experiments, a modified pair-comparison procedure was employed in two experiments to establish and assess membership functions for numerous probability terms. In both cases, subjects judged: a) to what degree one probability term better described that probability than another, and b) to what degree one term rather than another better described a probability. Task a) data from subjects was analyzed in terms of the axioms of an algebraic-difference structure, and membership function values were obtained for each term according to various ratio and difference scaling models. The axioms were well satisfied, and goodness-of-fit measures for the scaling procedures were quite high. Furthermore, the derived membership functions had interpretable shapes and satisfactorily predicted for each subject the judgements independently obtained in b). These results support the claims that the scaled values indeed represented the vague meanings of the terms to the subjects in the present context.

RN 88-57 Training Effectiveness and Cost Iterative Technique (TECIT) Volume II: Cost Effectiveness Analysis, Adams, A.V.; Rayhawk, M. July 1988. (AD A197 429) This research note discusses an important issue, the training of soldiers in the use of a weapon system, which is important to the operational cost and success of the system in the carrying out of its mission. Cost and Training Effectiveness Analysis (CTEA) models formalize the process of choosing among alternative training technologies by comparing the cost and training effectiveness of these technologies. In this report, an economic framework is presented for integrating cost and training effectiveness data for CTEA studies. The framework builds on transfer effectiveness models and offers a model for the effectiveness of cost-minimizing training technologies. The model is particularly well-suited to the selection of training technologies for tasks that are trained on weapons systems whose operation is costly or life threatening. The research note shows how cost data would be developed for the model in evaluating computer-assisted instruction as a training technology for the M1 Abrams tank.

RN 88-58 Prolonged Heavy Vehicle Driving Performance: Analysis of Different Types of Following Manoeuvre, Fuller, R.G.C. July 1988. (AD A198 730) This research note examines the effects of time driving on truck drivers' behavior in range of different following manoeuvres, and the relationship between speed and time headway in steady-state following. Three types of driving conditions are included: normal, two-vehicle convoy, and unpredictable shift onset and duration. Results of the experiments were that drivers, when adjusting headway in most types of following manoeuvres, take account of the probability of leading vehicle deceleration (adopting a longer headway when the possibility of

such deceleration is relatively high), and of variations in ongoing capability (adopting a longer headway when capability is perceived as less than optimal). Results also indicate that drivers show a preference for a headway of about 70 feet, almost irrespective of their speed. These findings have been interpreted within the framework of a behavioral analysis of the task of driving. Implications for driver safety, selection, and training, and for driving practice are outlined. An evaluation of time headway as a measure of driver performance is presented, and some issues for future research are identified. In particular, it is suggested that much more emphasis could usefully be placed on the identification of those rewards which reinforce both safe and dangerous driving, with a view toward greater control of the driver's reward system.

RN 88-59 Bradley Fighting Vehicle Conduct of Fire Trainer: The Instructor/Operator, Salter, M.S. July 1988. (AD A197 462) This research note reports on preliminary research conducted into the impact of the Conduct of Fire Trainer (COFT) Instructor Operators for the Bradley Fighting Vehicle on apparent COFT gunnery performance. Some Instructor Operators were shown to have consistent behavior patterns which may have masked true gunnery performance. Further research is needed.

RN 88-60 An Automated Method for Forecasting Daily Aviator-Training Resource Requirements, Foster, D.L.; Tremont, P.J.; Hawthorne, T.W. April 1988. (AD A196 283) This research note discusses a topic important for aviation training. Currently, forecasts of aviation training resource requirements are produced manually, and frequently out of date. An automated method for producing training resource requirement forecasts was developed for the AH-IS Aviator Qualification Course, the Methods of Instruction Course, and the Instructor Pilot Course. The method employs a computer matrix to store data on determinants of resource requirements such as student load, class frequency, and phase of training. Formulas to calculate requirements from these determinants were developed, and a computer application to automate the calculation of the requirements was produced. The method described herein is applicable to other Army Aviator Courses and may be modified to apply to any resource-intensive Army course.

RN 88-61 Enkephalin Effects on Learning and Memory, King, J.E.; Fobes, J.L.; Michels, R.R.; Scott, A.G. July 1988. (AD A197 989) Three experiments were conducted to assess the effects of a met-enkephalin analog [D-Ala2]-methionine enkephalinamide (DAME) on learning and memory of monkeys. Experiment 1 demonstrated that DAME impaired multiple discrimination reversal learning by capuchin monkeys. The DAME effect was not caused by DAME's effect on the monkeys' response to distracting or irrelevant stimuli nor was it caused by increasing production of systematic errors. Experiment 2 revealed DAME enhancement of two-choice spatial delayed response performance by squirrel monkeys at long but not short delays. However, in Experiment 3 low doses (100 micrograms/Kg) of DAME impaired delayed response performance on nine-choice spatial delayed response. DAME did not exert disproportionate effects on systematic as opposed to nonsystematic errors in either Experiment 2 or 3. DAME clearly has differing effects on different types of learning and memory problems in primates. These results strongly indicate that DAME would not be an effective agent for improving human performance.

RN 88-62 Description of Selected Army Staff Functions: Targets for Planning Aids, Carter, C.F., Jr.; Archer, M.A.; Murray, A.E. July 1988. (AD A197 449) This research note identifies division-level coordinating staff functions, and analyzes their contribution to tactical decision making. The coordinating staff functions of intelligence (G2), operations (G3), and logistics (G4), are decomposed into tasks and subtasks. The tasks are evaluated as to importance to the decision making process, and as to amenability to the application of advanced information processing, including the use of artificial intelligence techniques. Based upon Army experts' advice, and upon the professional judgement of the authors, functional tasks which were considered to have high priority for human performance enhancement were selected and put in order of priority. The top six priority tasks were further decomposed into subtasks to better identify opportunities for human performance enhancement. The six staff tasks for early human performance enhancement are: analyzing tactical courses of action, analyzing battlefield areas, analyzing tactical capabilities, evaluating the enemy threat, analyzing logistic capabilities, and developing tactical courses of action.

RN 88-63 Tenure Patterns of U.S. Commissioned Officers in the 1970s and 1980s, Hunter, F.T. July 1988. (AD A197 609) In this research note, data on Army commissioned officers are analyzed to generate basic information on their tenure patterns, and to test the operational utility of the Army Research Institute's Officer Longitudinal Research Data Base (OLRDB). Tenure patterns are compared across three "entry-year groups" consisting of officers starting their current, or most recent, active duty service in 1971, 1976, or 1980. For these officers, the following data are extracted from the OLRDB: year of entry on active duty in current tour, source of commission, basic branch, sex, race, procurement code, separation date, reason for separation, and rank (current rank, or rank at time of separation from active duty). Analyses address questions such as these: how did entry groups differ in terms of the variables listed above, what were the tenure patterns of the three entry-year groups as of FY86, what proportion of officers remained, and were retained, in active duty status beyond the initial obligated tours, did the rate of separation vary by branch, source of commission, sex, and race, what are the rank distributions for the groups remaining on active duty as of FY86? The results suggest several key issues pertinent to officer training and to the development of measures and procedures to assess officer development.

RN 88-64 Canceled.

RN 88-65 The Enlistment Decision: A Selected, Annotated Bibliography, Wilson, M.J.; Gay, N.L.; Allen, B.F.; Celeste, J.F. July 1988. (AD A197 914) This research note consists of an annotated bibliography describing Army enlistment decision research. The bibliography summarizes research undertaken from both the marketplace (economic) and motivational (sociological and psychological perspectives. The research reports and articles consistently identify pecuniary and nonpecuniary factors influencing enlistments. The bibliography was compiled using input from both automated literature searches and experts in the field of enlistment decision research.

RN 88-66 Diagnosis and Remediation in the Context of Intelligent Tutoring Systems, Sleeman, D.; Kelly, A.E.; Martinak, R.; Ward, R.D.; Moore, J. July 1988. (AD A199 024) This research note provides an overview of the four major aspects of the PIXIE

project: the field work undertaken to determine how teachers diagnose and remediate during introductory algebra courses, the set of experiments run to determine the relative effectiveness of Model-Based Remediation (MBR) and Reteaching, systems work carried out to remedy shortcomings noted earlier in the Intelligent Tutoring System (PIXIE), and an experiment run to determine whether it is possible to enhance teachers' diagnostic capabilities. More detailed discussion of each of these topics are provided in four separate reports.

RN 88-67 Database on Minorities and Women in Science, Engineering, and Technology, Kay, N.W. July 1988. (AD A198 284) This research note discusses a database designed to be used as a resource in research on the education and careers of minority members and women in such quantitative fields as engineering, mathematics, physics, chemistry, computer sciences, and the environmental sciences. The references were selected after an extensive search, both computer and manual. The database contains 370 empirical studies on women and minority members, with variables identified and placed in categories. The database was developed using INMAGIC software and is accessible by the use of keywords. At the present time, access is possible only through INMAGIC software, and this research note describes how to gain access in that fashion.

RN 88-68 Human Plausible Reasoning, Collins, A.; Burstein, M.; Baker, M. July 1988. (AD A197 426) This research note describes the current state of implementation of a cognitive computer model of human plausible reasoning, based on the theory described by Collins and Michalski. The note's goal is to use simulation as a way to test and refine the theory. This required developing appropriate memory organization and search techniques to support this style of inference, finding ways to estimate similarity in specific contexts, and to investigate ways of combining the sometimes contradictory conclusions reached when inferences of different types are used to answer questions.

RN 88-69 Time Perception and Evoked Potentials, Fraisse, P. July 1988. (AD A198 616) In this research note, time perception is studied from a psychophysical and electrophysiological point of view, during durations reproduction experiments. No relation was found between the auditory evoked potential (AEP) amplitude and durations reproduction errors. The AEP amplitude if influenced, however, by the interval between the clicks and the repetition of the simulations. The results of the durations reproduction task show an over-estimation of the shorter intervals and an under-estimation of the longer ones.

RN 88-70 Studies of Diagnosis and Remediation With High School Algebra Students', Martinak, R.; Sleeman, D.; Kelly, A.E.; Moore, J.; Ward, R. July 1988. (AD A199 022) This research note compares the effects of reteaching and different styles of error-based remediation. More research is needed to understand the factors which lead to successful remediation. Six studies discussed in this RN compare error-specific or model-based remediation (MBR) with reteaching in algebra. The results show that MBR and reteaching are both more effective than no tutoring, but MBR is not clearly more effective than reteaching. The results are discussed both in terms of stability of errors, and of their relevance to educational practice and the field of intelligent tutoring systems.

RN 88-71 A Study of Diagnostic and Remedial Techniques Used by Master Algebra Teachers, Kelly, A.E.; Sleeman, D. July 1988. (AD A199 021) This research note raises the issues of what makes for effective diagnosis and remediation of linear algebra equations, and how this effects the development of intelligent tutoring systems. The note reports three studies. In the first, four experienced teachers were given a series of incorrectly worked algebra tasks and asked to provide diagnosis and remediation (n.b. the students were not present). The second study was a series of interviews with three Irish math teachers discussing their approaches to algebra diagnosis and remediation. The third study observed a teacher remediating eight students on the basis of diagnoses provided by the PIXIE (ITS) program. We noticed that this teacher probed for causes beneath the surface errors made by the student. The major conclusions of the three studies were that teachers generally taught algebra procedurally rather than conceptually, and that teachers thought it important to determine the causes behind errors.

RN 88-72 TPIXIE: A Computer Program To Teach Diagnosis of Algebra Errors, Kelly, A.E.; Sleeman, D.; Ward, R.D.; Martinak, R. July 1988. (AD A199 015) This research note examines the implementation of the program used in this study, TPIXIE, which was predicated on the assumption that acquiring the skill to diagnose student errors is important to trainee teachers. The TPIXIE system, a part of the PIXIE family of intelligent tutoring systems, was designed to present users with a series of task-student-answer pairs (where the student's answer was incorrect). The system presents several sets of tasks together with a student's responses, and then presents further tasks, while asking the user to *predict* the responses. If the user is unable to do this, the complete student working is displayed, and the cycle is repeated.

RN 88-73 Development of a Driver Alert System (DAS) for the Bradley Fighting Vehicle, Champion, D.F.; Roberson, P.R.; Lewis, D.E. July 1988. (AD A199 023) Observation of Bradley Fighting Vehicles (BFVs) in the field revealed a potential for communication problems between drivers and commanders. Since communication was by intercom only, electrical failure, battle damage, unplugging or removal of the driver's CVC helmet, or interference from platoon radio traffic could disrupt the system. For this reason, an emergency/backup driver alert system was developed. An audible two tone warbler alerting device was fitted into the driver's compartment, and an activating switch was placed in the commander's compartment. Very preliminary research data appears to indicate that this is an effective way for the driver and commander to ensure that they remain in contact.

RN 88-74 Enhancing PIXIE's Tutoring Capabilities, Moore, J.L.; Sleeman, D. July 1988. (AD A199 020) This research note discusses the design of the PIXIE Intelligent Tutoring System, specifically a series of recent design enhancements. The original systems has been implemented in three phases: the offline, or model generation, phase; the online, or tutoring phase; and the analysis phase. The offline phase has a set of models being constructed for a given domain. The online phase involves tutoring the student with both diagnosis and remediation of errors. In the analysis phase, undiagnosed errors are examined. When they are consistent, they are added to the existing domain knowledge base. Four recent enhancements arising from shortcomings noted in student trials are then discussed. Two of these involve the diagnosis of errors, and two involve their remediation.

Research Notes

RN 88-75 Canceled.

RN 88-76 An Intelligent Knowledge-Based Tutoring System for a Transponder Test Set, Somers, L. August 1988. (AD A199 443) This research note describes the development of an "Intelligent Knowledge-Based Instructional System (IKIS)", a portable, pc-based tutor for training operators of the Teledyne AN/APM 424 transponder test set. The system consists of a high-fidelity simulation of the functional operations of the test set, together with mechanisms for teaching cognitive, situational, and procedural components of skills in operation and fault identification at the flight line level of operations. The IKIS demonstrates the basic components required of an intelligent tutoring system, including a knowledge base, an inference engine, a student model, a tutoring strategy, and a well-defined interface for user/system transactions. The report also discusses strategies for the further development and refinement of the knowledge representation approach, student modelling, and instructional strategies and methods.

RN 88-77 The Job Skills Education Program: Extended Tryout, Dick, D.W. August 1988. (AD A199 620) This research note deals with the Job Skills Education Program (JSEP), a standardized computer-based curriculum for soldiers who lack skills necessary for proper performance of their skill level 1 and 2 jobs. The lessons are based on a detailed analysis of the 94 most common military occupational specialties and on soldiers' common tasks. JSEP is being tried out at Forts Riley, Leonard Wood, Lewis, and Sill prior to its Army-wide implementation. This note covers the period of the Extended Tryout. It describes the activities that were conducted at the four sites in an effort to fine tune the JSEP curricula, the Soldier Management System, and the computer and instructor operating procedures. The major findings during the Extended Tryout period were that soldiers were able to complete their lessons successfully, and that strong local command support is necessary in order for an innovative new program to succeed.

RN 88-78 Frequency Monitoring: A Methodology for Assessing the Organization of Information, Hock, H.S.; Hasher, L. August 1988. (AD A202 245) The general purpose of the research reported in this research note was to evaluate the viability of a technique for assessing the encoding of componential and higher-order memory units of visual stimuli. The first section of the note provides an extended summary of results for encoding strategies, spatial relations research, and frequency judgement theory. The second section describes experiments which specifically use the frequency-judgement procedure, and section three describes experiments conceptually related to the frequency-judgement work.

RN 88-79 Models of Incremental Concept Formation, Gennari, J.; Langley, P.; Fisher, D. August 1988. (AD A199 617) Given a set of observations, humans acquire concepts which organize the observations, and use them to classify future experience. This type of concept formation can occur in the absence of a tutor, and it can take place despite irrelevant and incomplete information. A reasonable model of such concept learning should both be incremental and capable of handling the type of complex experiences that people encounter in the real world. In this paper, we review three previous models in incremental concept formation, and then present *Classit*, a model that extends the earlier systems. All of the models integrate the process of recognition and learning, and all can be viewed as carrying

out searches through the space of possible concept hierarchies. We also present some empirical studies of its behavior under a variety of conditions, in an attempt to show that *Classit* is a robust concept formation system.

RN 88-80 Canceled.

RN 88-81 Judgement and Decision Making in Dynamic Tasks, Hammond, K.R. August 1988. (AD A199 907) A theory of task conditions is presented on the ground that such a theory is a prerequisite for studying dynamic decision making. The principal features of the theory are (a) a task-cognition inducement principle, (b) a distinction drawn between surface and depth characteristics of tasks, and (c) a task continuum index. Also presented is a theory of cognition in dynamic tasks, the main features of which are (a) a cognitive continuum index set in parallel with the task continuum index, and (b) a description of the role of pattern seeking and functional-relation seeking in dynamic tasks. The practical consequences for both designers and operators are indicated.

RN 88-82 Strategy-Based Technical Instruction: Development and Evaluation, Dansereau, D.F. August 1988. (AD A199 903) This research note discusses scripted peer cooperation, an economical and effective technique for improving the acquisition of technical knowledge and skills. Experiences with scripted cooperation have also been shown to facilitate transfer to individual learning situations and to unscripted groups. At a more specific level, the research behind this note has identified parameters relevant to the assignment of participants to dyads based on pre-measured characteristics, to the selection of scripts dependent on target tasks and the outcomes desired, and to the use of node-link knowledge maps as communications props. In addition, we have used our detailed analyses of cooperative interactions to develop models of task-oriented group processing. This research program has thus provided a basis for the development of an information processing model of cooperative learning, and our detailed analysis of this approach has been a first step in providing a conceptual framework for this powerful educational technique.

RN 88-83 Canceled.

RN 88-84 Human Factors Research in Aircrew Performance and Training: Annual Summary Report, Aldrich, T.B.; McAnulty, D.M. August 1988. (AD A199 906) This research note presents summary descriptions of research projects performed for ARI at Fort Rucker, Alabama. During the period 18 February 1986 through 8 October 1987, contractor personnel worked on 17 research projects in the areas of emerging system design, manpower and personnel, aviation simulation, and aviator training. The summary description for each project contains a background section that describes the rationale for the project, and specifies the research objectives, a research approach section that describes the tasks and activities required to meet the project objectives, a results section describing the research findings (or, in the case of developmental activities, the research products), and, finally, a project status section that describes the work completed and projections for future research, if any.

RN 88-85 An Overview of the Architecture for WE 1.0, Bush, P.E.; Ferguson, G.J.; Smith, J.B.; Weiss, S.F.; Bolter, J.D.; Lansman, M. September 1988. (AD A199 467) This

research note discusses WE, a graphics-based Writing Environment. It provides tools to support the entire writing process, from brainstorming to document revision. Users visually transform their ideas from a network to a hierarchy defining document structure. The prototype system is written in Smalltalk-80, an object-oriented interpreted language. This document presents the architecture of the WE version 1.0 prototype system. Sections cover the high-level component layout, the class hierarchy, the flow of control, the support framework, and the database support. Readers should be familiar with object-oriented programming in general and Smalltalk in particular to understand the note completely.

RN 88-86 Multipurpose Arcade Combat Simulator (MACS): Year Three Report, Hunt, J.P.; Broom, J.M.; Greene, W.H. September 1988. (AD A199 468) This research note discusses research accomplished during the period from October 1986 to September 1987. During this period, research focused on three areas: developing software for the M136 Anti-armor Weapon, developing a ten-level BRM cartridge, and developing an eight-level ARM cartridge. Descriptions of all software development are given in the report, and appendixes are provided documenting general software architecture of MACS with detailed flow charts, and detailed outlines of the BRM and ARM cartridges.

RN 88-87 Lessons Learned From ET Design Process for ASAS/ENSCE, Evans, D.C.; Adams, J.E.; Simpkins, M.L.; Aldrich, R.; Dyer, F.; Narva, M. September 1988. (AD A199 469) This research note discusses the lessons learned from the application of existing embedded training (ET) design guidelines to an emerging system. The system to which the guidelines were applied was the All Source Analysis System/Enemy Situation Correlation Element (ASAS/ENSCE). The note presents the lessons learned from three phrases of the project: task analysis, selection of ET requirements, and development of a training design concept. In addition to the lessons learned, recommendations for the modifications of the guidelines are presented.

RN 88-88 Development of LHX MANPRINT Issues, Jones, R.E., Jr.; Trexler, R.C.; Barber, J.L.; Guthrie, J.L. September 1988. (AD A199 530) This research note documents one state in the incorporation of Manpower and Personnel Integration (MANPRINT) into the early stages of the acquisition of a major weapon system. It describes a process of identifying and analyzing the human factors, health hazard, and training issues associated with the Light Helicopter Family (LHX). The RN also describes the LHX MANPRINT Data Base Management System an automated data base whose structure and operation should be generally useful in any acquisition of materiel.

RN 88-89 Canceled.

RN 88-90 Literature Survey. Part I: Assessment Technology, Harris, P.A.; Hendrix, E. September 1988. (AD A203 113) A literature survey of assessment technology and application was conducted to identify techniques that might be useful to an executive development program for future leaders of the U.S. Army. Literature was sorted into five categories: assessment purpose, procedures, validity, cost/benefit analysis, and assessor qualifications. Abstracts of 27 validity studies were prepared and presented in a summary table. A second summary table presented information on level, validity, purpose, costs, and assessor level for

16 assessment programs. The majority of the literature was found to be based on mid-level assessment for industrial requirements. Research and application is currently moving toward situational testing, rather than psychometrics. Assessment center techniques continue to be popular in medium and large firms. Longitudinal studies of predictive validity of assessment center techniques show acceptable validity measures. Cost/benefit analyses of assessment techniques are hampered by a lack of individual benefit metric. Monitoring also by Office of Personnel Management, Workforce Effectiveness and Development, Office of Training and Development, P.O. Box 7230, Washington, D.C. 20044.

RN 88-91 Non-Optimality in the Diagnosis of Dynamic System States, Barnett, B.;
Wickens, C.D. October 1988. (AD A202 462) This research note discusses various sources of non-optimality in the diagnosis of a dynamic system's state, looking at them within the context of a military flight scenario. Subjects examined integrated cues which varied in their informational worth under different conditions of information load and clue salience. Actual responses were correlated with an optimal response function, as well as with seven non-optimal response functions, modeled on the basis of filtering, heuristics, and salience biases. Sequential updating strategies were also analyzed. Results from the two studies indicated that the optimal response function provided the best fit to the data. The imposition of time stress produced a slight bias in favor of processing more salient display locations. A significant performance decrement occurred in secondary task conditions, manifest in a trend toward conservatism in judgement, but no biases in display sampling. Analysis of sequential updating strategies also suggested that hypothesis updating was somewhat conservative.

RN 88-92 MANPRINT in LHX: Organizational Modeling Project, Robinson, R.E.;
Lindquist, J.W.; March, M.B. Pence, E.C. November 1988. (AD A201 991) The research discussed in this research note was undertaken to demonstrate the feasibility of using organizational modeling in the Light Family of Helicopters (LHX) program as an iterative tool to probe Manpower and Personnel Integration (MANPRINT) constraints beginning early in the system acquisition process. An organizational model with four components was constructed to translate LHX integrated logistics support/reliability, availability and maintainability (ILS/RAM) characteristics into mission capability for MANPRINT evaluation. The context used was the Attack Helicopter Company (AHC) in the Army of Excellence (AOE) table of organization and equipment for the Air Assault Division (AAD), which is scheduled to become an LHX scout/attack (SCAT) helicopter pure unit. The model was exercised using RAM factor goals for LHX, and an AHC 7 day/8 LHX per mission requirement to establish a base case capability with the goal LHX. Three mission variants were also investigated to test the sensitivity of the organizational manning developed to the duration of continuous operations and to the number of LHX per mission. Manpower and Training resources for each case were reviewed in comparison with those authorized in the AOE AAD AHC. The capability of the model to translate projected RAM data into mission capability was demonstrated. Overall, organizational modeling with the LHX goal factors suggests that Mission Area Analysis (MAA) flight hours for LHX can be supported in the AAD AHC (LHX) without increasing current AOE AAD manpower allocations. The probabilities of LHX repair actions and administrative and logistics downtime obtained from the LHX RAM Rationale Report and used in the analysis prevented the achievement of the full mission capability goal of providing 8 LHX per mission from the 11 LHX available in the AHC. These probabilities were found to be nonrestrictive

when the full mission capability goal was changed to 6 LHX per mission, and a minimum of 10 LHX available in the AHC.

RN 88-93 Empirical Demonstration of Isoperformance Methodology Preparatory to Development of an Interactive Expert Computerized Decision Aid, Kennedy, R.S.; Jones, M.B.; Baltzley, D.R. November 1988. (AD A202 439) This research note reports on the increasing need within the Department of Defense to improve systems performance through better integration of men and women into military systems. The underlying theme of the Research Note is that once the level of operational performance is settled upon, trade-offs among available resources can and should be made. Formal methodologies are proposed which permit mixtures of training, equipment, and individual differences to be traded off to arrive at a prescribed level of systems performance. This approach is called "isoperformance".

RN 88-94 Tri-Service Review of Existing System Embedded Training (ET) Components, Warm, R.E.; Roth, J.T.; Sullivan, G.K.; Bogner, M.S. November 1988. (AD A203 195) When it is used as an integral part of system design, Embedded Training (ET) offers what appears to be a unique cost-effective training capability. As part of an effort to develop and implement procedures for designing ET, a survey of the ET systems already fielded was conducted, in order to identify the ET system characteristics which could be included in an ET component for an array of systems, missions, and training and operational environments. The data gathered during this review will be used in the development of ET design procedures to incorporate lessons learned from earlier ET component developments.

RN 88-95 Market Survey and Analysis in Support of ASAS Computer-Based Training System Design, Witus, G.; Bicknell, B.J.; Cherry, W.P.; Purifoy, G.R., Jr. November 1988. (AD A202 392) This research note describes a market survey of computer-based training technology conducted to provide a basis for design decisions in the All Source Analysis System/Enemy Situation Correlation Element (ASAS/ENSCE) program. This information was evaluated within the context of three alternative training equipment configurations, and a recommendation was made for the selection of one of the three. The appendixes of the note present the information obtained on current computer based training systems, authoring systems, image scanners, monitors, and graphics boards.

RN 88-96 Human Factors and Safety Assessment: M1A1 Abrams 120-mm Gun Tank Follow On Evaluation, Lyons, L.E.; Warnick, W.L.; Kubala, A.L. November 1988. (AD A202 911) This research note describes the MANPRINT assessment which forms part of the Follow-On Evaluation (FOE) of the M1A1 main battle tank conducted at Fort Bliss from December 1986 through August 1987 by the Army Operational Test and Evaluation Agency. MANPRINT evaluation support was provided by the Army Research Institute's Fort Hood Field Unit. The M1A1 FOE was conducted using 41 of the tanks assigned to the 3rd Squadron, 3rd Armored Cavalry, and their crews. Data for the assessment were obtained through structured interviews, questionnaires, observation of squadron operations and evaluation of calibration/gunnery performance of crews during the FOE. The primary issues investigated were: ease of calibration of M1A1 main armament, logistic supportability, and NBC system operations. Inquiry was also made as to the number of previously identified

MANPRINT/human factors deficiencies uncorrected in the production version. Significant findings during the FOE were: insufficient refueling capacity in the tested support platoon, low reliability of the Simplified Test Equipment, when used in high ambient temperature conditions, and an NBC backup system which does not filter out carbon monoxide gas (a deficiency discovered during the M1E1 operational test II in 1984).

RN 88-97 Target Acquisition and Analysis Training System (TAATS): Verbal Cue Recognition, Training Readiness and GT Score as Correlates of Performance With the Basic Combat Vehicle Identification (CVI) Training Program, Shope, G.L.; Smith, N.D.; Heuckeroth, O.H.; Bolin, S.F. November 1988. (AD A203 065) This note discusses how within the context of the Target Acquisition and Analysis Training System (TAATS), the Basic Combat Vehicle Identification (CVI) training program was used to gain insight into the influence of GT scores, verbal skills, and morale on vehicle identification performance. Verbal skills were measured with an instrument created for this study, the Verbal Cue Recognition (VCR) Test. Morale was measured with items drawn from the Commander's Unit Analysis Profile (Palmer et al, 1983), and titled the Training Readiness Questionnaire (TRQ)

All soldiers received the same treatment, a standard administration of the Basic CVI Training program following the administration of both the VCR and TRQ tests. A regression model was developed using the VCR test, the TRQ, and the GT for the first sample. Results of the sample indicated that the VCR test, the TRQ and the GT were correlates of performance with the Basic CVI Training Program. A cross-validation of the model, using the second sample was conducted, and the regression model composed of the VCR, TRQ, and GT showed a weakness as a predictor with the validation sample used. Further work is required to refine this model.

RN 88-98 A Preliminary MANPRINT Evaluation of the All Source Analysis System (ASAS), Kubala, A.L. November 1988. (AD A202 813) The object of the limited evaluation described in this research note was to provide data useful to ASAS developers. To that end, the note presents the findings of a limited MANPRINT evaluation of the All Source Analysis System (ASAS) conducted during operational testing in November and December of 1986. Questionnaires addressing the six MANPRINT domains were administered to all operators and their immediate supervisors. Questionnaires on system functions were given to personnel supervisors and to observers. Operators were interviewed at the end of the trials. Workspace and physical measurements were obtained in the Forward Sensor Interface and Control work-shelter module to assess their compliance with appropriate human factor engineering standards. The collection of meaningful data was severely hampered by security, equipment, and organizational restrictions.

RN 88-99 Evaluation of the Job Skills Education Program: Learning Outcomes, Hoffman, L.M.; Hahn, C.P.; Hoffman, D.M.; Dean, R.A. November 1988. (AD A205 352) This report describes the evaluation of the Job Skills Education Program (JSEP), a computer-based, job-relevant curriculum designed to teach soldiers competencies prerequisite to learning job skills. Researchers observed and gathered data on the program at seven Army installations at which the program was being pilot-tested, and interviewed and administered questionnaires to program participants and administrators. Findings indicate that, with few exceptions soldiers enjoyed participating in the program. Although soldiers enrolled in JSEP

to improve their General Technical (GT) scores, findings show a negligible effect of JSEP on GT improvement. JSEO effects on the Tests of Adult Basic Education are .6 grade level in reading and 1.6 grade level in mathematics. More than 50% of soldiers passed three fifths of the pretests and so did not undergo instruction. However, soldiers who failed the pretests and took instruction usually mastered the content. Completion of JSEP prescriptions varies greatly from soldier to soldier.

RN 88-100 Evaluation of the Job Skills Education Program: Curriculum Review, Hoffman, D.M. November 1988. (AD A204 097) This report evaluates materials that are part of the Army's Job Skills Education Program—a job-relevant, computer-based program designed to provide soldiers with skills prerequisite to learning job tasks. The researcher selected a representative sample of lessons for evaluating and reviewed the diagnostic pretest, soldier management system, and instructor's manual. Recommendations are as follows: re-write lessons to reduce the focus on steps or rules and emphasize underlying concepts or ideas; encourage students to practice applying skills learned in related novel contexts; provide more opportunity for students to practice higher order skills; re-write lessons to provide explanatory context for all lesson material; allow students more freedom to repeat lessons or sections of lessons; allow students to see errors on tests; and revise manuals to make them more helpful and user-friendly.

RN 88-101 Evaluation of English Language Needs, Preparation, and Screening Among Non-Native English Speaking Officers and Soldiers, Dean, R.A.; Hoffman, L.M.; Hoffman, D.M. November 1988. (AD A203 611) This research note offers information that will contribute to the establishment of minimum competency levels for two tests of English proficiency the English Comprehension Level Test and the Oral Proficiency Interview. Data were collected from the Defense Language Institute and the Personnel Information Systems Command, based on the responses of 72 non-native English speaking soldiers, and 39 of their supervisors, and from 119 surveys of officers commissioned in Puerto Rico. Findings indicate that the tests do not adequately measure the English proficiency soldiers need to do their jobs. A model for determining the validity of established test standards is appended to the research note.

RN 88-102 Determination of Research Priorities and Documentation of Information Sources for Army Civilian Personnel Management, Knerr, C.M.; Keller, S.D.; Sticha, P.J.; Ziemak, J.P.; Rose, D.E.; Hunter, R.W.; Woolley, S. December 1988. (AD A204 738) This report describes the first stage of a multiyear research program. The goal of the overall program is to develop products that will help the Army manage its civilian workforce. Three requirements of this initial state were to (a) identify research projects and products that offer the highest benefit to Army sponsors and users, (b) document the availability and quality of information pertaining to those projects, and (c) allocate resources to accomplish the goals of the projects. The most beneficial research projects focused on the selection, training, and development of leaders, supervisors, and managers of the Army civilian workforce. This report documents the methods and results of the focusing process and presents a prototype data index that catalogs the Army civilian personnel data sources and data elements.

RN 88-103 Target Acquisition and Analysis Training System (TAATS): Retention and Effects of Retraining, Heuckeroth, O.; Smith, N.D.; Shope, G.L. December 1988. (AD A204 294) Within the context of the Target Acquisition and Analysis Training System (TAATS), the Basic Combat Vehicle Identification (CVI) program was used to explore decay in recognition and identification (R&I) performance as time from training increases and to investigate the effects of subsequent training on performance. Four groups of 45 soldiers were selected from the 1st Cavalry and 2d Armored Divisions at Fort Hood, Texas. A control group received no training but was tested at 3-week intervals throughout the study period. Analysis of the test data leads to the following conclusions: (1) The greatest decay in recognition and identification performance after CVI training occurs within the 3-week period immediately following the training. Thereafter decay appears minimal or nonexistent for up to 9 weeks. The research did not deal with retention beyond 9 weeks. (2) Different soldiers require differing amounts of CVI training to attain specific levels of performance; once a specific level is attained, however, performance generally decays at the same rate for all. (3) Significant performance improvement occurs after initial training, after a second repetition of this training 3 weeks later, and also when the second repetition is given 6 weeks after initial training. (4) Combat vehicle identification performance levels obtained as a result of CVI training are correlated with General Technical (GT) score.

RN 88-104 Unassigned.

RN 88-105 Prioritizing Candidate Decision Aids for Tactical Applications: Report of a Workshop, Riedel, S.L. December 1988. (AD A207 510) This report describes a methodology for prioritizing tactical expert systems for development. The methodology was assessed in an action officer prioritizing workshop, and the report presents lessons learned in using the methodology, recommendations for improving the methodology, and the results of the prioritization. The following aids were rated as the four top candidates for expert system development: Alternate Courses of Action Analyzer, Force Movement Analyzer, Obstacle Preparation, and Fuel Consumption Rate Analyzer.

RN 88-106 Human Cognition and Information Display in C3I System Tasks, Howell, W.C.; Lane, D.M.; Holden, K.L. December 1988. (AD A210 012) It is widely recognized that the growing demands of modern warfare strain and in some cases exceed human cognitive capabilities. Although modern command, control, communication, and intelligence (C3I) systems incorporate a number of advanced design concepts to reduce the burden on operators, it is essential that they retain certain key controlling functions. Therefore, efforts toward improving our understanding of how various design concepts affect human (and overall system) performance must continue. In particular, it is not always clear how general design principles relate to the specific kinds of critical tasks performed by operators in C3I systems. The purpose of this report is to present a highly selective review of the literature on C3I tasks, display principles, and human information processing functions with an eye toward identifying promising variables or concepts for evaluation in a simulated system context. The review is organized into three sections. The first discusses various features of C3I tasks and the particular cognitive requirements that each poses for the operator. The second section explores particular cognitive research domains (e.g., mental capacity limitations and time-sharing, conditions for parallel processing, and irrelevent information and information processing) that

bear on the task requirements identified above. Finally, the third section briefly discusses implications for research into specific display design issues.

RN 88-107 A Review of Models and Procedures for Synthetic Validation for Entry-Level Army Jobs, Crafts, J.; Szenas, P.L.; Chia, W.J.; Pulakos, E.D. December 1988. (AD A205 438) This review presents relevant literature in the areas of synthetic validation, job component models, and expert judgments. Synthetic validation is a logical process for inferring test battery validity from elemental test validities for job components. The review describes a number of key linkages required for synthetic validation, presents a model of the steps to establish linkages, reviews and evaluates synthetic validation studies in terms of how completely linkages were established and empirically supported, and concludes that sound techniques exist to investigate synthetic validation as a basis for test development for entry-level Army jobs. The review introduces issues important to the choice of a job component model that will describe more than 250 entry-level Army jobs and defines four basic ways to describe and classify jobs. Models representing each approach are discussed and evaluated in terms of applicability for the Army's synthetic validation efforts. Issues related to reliability and validity of expert judgments are discussed. The report concludes with suggestions for development of job component models, judgment procedures, and synthetic validation procedures specific to requirements of the Synthetic Validation Project.

RN 88-108 Development of Job-Relevant Knowledge Tests for Longitudinal Validation: Appendix to ARI Technical Report 829 (2 vols.), Schultz, S.R.; Kuhn, D.B.; Walker, C.B. December 1988. (V. 1—AD B131 864; v. 2—AD B131 910) The research described in this report was performed as part of Project A, the U.S. Army's current large-scale manpower and personnel effort for improving the selection, classification, and utilization of Army enlisted personnel. This report is an appendix to an ARI Technical Report that deals with research on the performance of soldiers in training. The task required creation of reliable and content-valid Job-Relevant Knowledge Tests (JRKTs) for 21 Military Occupational Specialties (MOS) that can (1) measure the cognitive component of training success, and (2) predict first- and second-tour job performance. The report describes the methods used to develop the initial item pools for each MOS from relevant Army materials; to revise the items and develop tests on the basis of reviews by job incumbents, school trainers, school trainees, and Training and Doctrine Command (TRADOC) proponents; and to administer the tests during the Concurrent Validation phase (June-November 1985) of Project A and prepare revised and shortened tests for use in the Longitudinal Validation phase (begun in 1987). This Research Note contains the tests being used during Longitudinal Validation and is subject to distribution limitations.

RN 88-109 Enlisted Personnel Allocation System—Volume I; Volume II—Appendixes, Konieczny, F.; Brown, G.; Davis, R.; Hudson, R.; Hutton, J.; Stewart, J. December 1988. (AD A209 274) The Army Research Institute, with the assistance of the General Research Corporation, is undertaking a project to modernize and improve the way the Army selects individuals for training in Military Occupational Specialties (MOS). This project is called the Development of the Enlisted Personnel Allocation System (EPAS). This report presents the final annual report of activities supporting the development and implementation of EPAS during the 6th year of the contract.

RN 88-110 Preliminary Review of the 63W10 Course at Aberdeen Proving Ground, Ramsay, D.A.; Kessler, J.J.; Mirabella, A.; Thoreson, R.W. September 1988. (AD A206 272) We observed training of 63W10 mechanics at the US Army Ordinance Center and School and analyzed test scores for a sample of 16 classes. We also examined published data on performance deficiencies in FORSCOM units. We found high failure rates for some tasks in the school and in the field. On the basis of our observations and analyses, we generated 12 recommendations for improving wheel vehicle repairer training. One of them (improve classroom vugraph material) has already been implemented on the basis of a draft version of this report.

RN 88-111 Embedded Training (ET) and Training Devices for the Howitzer Improvement Program (HIP): Design Concept Recommendations Volume II: Appendices, Ditzian, J.L.; Sullivan, C.K.; Adams, J.F.; Bogner, M.S. November 1988. (AD B132 228) Embedded Training (ET), an integral part of weapon system design, offers what appears to be a unique training capability. As part of an effort to develop and implement procedures for designing ET, a task and training analysis was performed for the Howitzer Improvement Program (HIP), following procedures established earlier in the ET development effort. This report presents a functional design concept that encompasses ET and other types of training for the HIP. Hardware is proposed to fill the requirements of the proposed functions, and guidelines are established for further development of training. Questions and tradeoffs that must still be dealt with are also enumerated. This report also develops a training concept, training to full mastery, that may be specifically suited to ET. This Research Note is the Appendixes for ARI Research Report 1512, *Embedded Training (ET) and Training Devices for the Howitzer Improvement Program (HIP): Volume I.*

RN 88-112 Design Specifications for Product To Estimate Manpower Requirements of System Designs, Criswell, E.; Williford, R.; Smith, M. September 1988. (AD A207 511) The U.S. Army Research Institute is developing a set of computerized aids for the evaluation of weapon system designs in terms of the manpower and personnel that they require. This report is a detailed design specification for software that assists in estimating the number of operators and maintainers required for a given weapons systems design to achieve that system's criterion performance. Specifications in the form of menu maps, data entry templates, a high level state transition diagram, leveled data flow diagrams, a structure chart, entity relationship diagrams, and entity definitions are provided for the user interface, software and data bases. Data base security and user acceptance are also discussed. The development of this design has not been funded, but the design specification may prove useful for other projects.

RN 88-113 Feasibility Tests for -400-m Zeroing the -25-mm Gun of the Bradley Fighting Vehicle, Perkins, M.S.; Wilkenson, C.S. July 1988. (AD A211 784) Researchers developed a short-range zeroing procedure and target for the Bradley Fighting Vehicle's -25-mm gun to mininmize the negative impact of factors such as inaccurate boresight equipment, ammunition dispersion, and poor feedback of hit location, which offset zeroing conducted with procedures. A -400-m target offset aiming point for the sight and gun to a) account for parallax, and b).allow for the line of sight and aim of the gun to cross 1,000 to 1,200 m. Sight alignment for zeroing was based on the center of a three-round shot group for training

ammunition. With the experimental procedure and target, gunners detected holes in the target and were able to perform accurate sight alignment following boresighting with either accurate or inaccurate equipment. Location of shot-group centers on a 1,000-m target indicated that the gun was zeroed. Short-range zeroing has potential benefits in both training and combat when conditions are not optimal for standard zeroing.

RN 88-114 Analysis of System Factors Affecting Range-Related Accuracy of the 25-mm Gun of the Bradley Fighting Vehicle, Perkins, M.S.; Roberson, P.R. September 1988. (AD A211 716) This analysis was conducted to determine if system factors in the Bradley Fighting Vehicle (BFV) negatively affect round elevation or range-related aspects of 25-mm gunnery accuracy. Although a Soviet BMP vehicle is about 2.15 m high, the horizontal ranging stadia of the integrated sight unit (ISU) on a fielded BFV was designed to determine range for a target 1.5 to 1.7 m high (depending on the part of stadia used). For target ranges of 1,800 m and greater, super elevation (SE) compensation produced by the fire control system was more for armor piercing and less for high explosive ammunition than indicated by firing tables. SE compensation of the auxilliary sight unit closely matched data from the firing tables. For a sample of fielded vehicles, ISU backlash was usually no greater than 0.5 miles, while the mean value for the auxilliary sight unit was 1.7 miles. Switching magnification of the ISU caused aiming changes that varied widely among vehicles (0.5 to 5 mils). With these findings, BFV managers can identify potential system problems and undertake needed modifications.

RN 88-115 BIFV Squad and Platoon Leader Span of Control, Rollier, R.L.; Roberson, P.R.; Salter, J.A.; Graber, J.G.; Harbin, K.W. August 1988. (AD A209 824) A field exercise was designed to establish the necessary environment for tactical conditions under which platoon/squad leader span of control could be measured. The information recorded by the observer team and the chief controller support the view that there was no one area of measurement in which leader errors could be attributed directly to fatigue, stress, or preoccupation with other critical tasks. Failures of omission or commission seemed to reflect knowledge deficiencies or memory failure, not lack of time or crisis-invoked situations. The duties assigned to Bradley Infantry Fighting Vehicle (BIFV) squad and platoon leaders are considered to be well within their capabilities, given appropriate training. Recommendations for assisting squad and platoon leaders in the future includes development of a Combat Leader's Guide and creation of BIFV tactical exercises without troops (TEWT).

RN 88-116 Bradley Fighting Vehicle System Combat Effectiveness: Evaluations of Developments in Tactics, training, and Equipment, Rollier, R.L; Salter, J.A.; Graber, J.G.; Roberson, P.R.; Harbin, K.W.; Wilkinson, C.S.; Morey, J.C.; Salter, M.S. August 1988. (AD A211 751) This report deals with nine issues that affect the combat effectiveness of the Bradley Fighting Vehicle (BFV). The issues were selected for development and evaluation work during this project. Particular emphasis was placed on the conduct of operations under limited visibility conditions. The areas and the general findings for each area are as follows: a) the span of control requirements which are placed on the BFV platoon and squad leader can be satisfied by the typical small unit leader after appropriate training, b) the proposed standard operating procedure for implementing a BFV company work/rest schedule provides small unit leaders with a tool to counteract the debilitating impact of continuous operations, c) proposed modifications to the ammunition reload systems for the 25-mm gun and the coaxial machine

gun reducethe average time required to complete the task, permit a reduction in the number of personnel needed for the task, and simplify future training requirements, d) visibility from the troop compartment can be improved by modification of the present cargo hatch cover, e) proficiency in thermal sight operation can be increased through use of a newly developed training strategy and supporting training materials, f) the generally high quality of the Bradley Commanders Course can be made even more responsive to the needs of BIFV units through selected changes to course content, administrative practices, and student evaluation procedures, g) unit training for night operations will benefit from a proposed Night Training Program incorporating material from many diverse sources into an integrated training strategy, h) the through-the-sight video device is a promising concept for use in training and research publications in the fields of tactics and gunnery, i) self-propelled and remote-controlled model vehicles (1/8 scale) represent a promising training concept for applications in institutional training and home station sustainment training, when used on appropriately scaled ranges.

RN 88-117 Improved BIFV Troop Compartment Visibility: Development of a Transparent, Bullet-Proof Dome, Rollier, R.L.; Wilkinson, C. S.; Salter, J.A. August 1988. (AD A209 826) At present, personnel within the Bradley Fighting Vehicle's troop compartment must use a set of vision blocks (perscopes) while performing close-in local security checks, Forward Observer tasks, passive air defense, and battlefield reconnaissance prior to dismount. Use of a transparent cargo hatch cover was subjected to limited feasibility testing and the results support the conclusion that combat effectiveness is facilitated by the transparent cargo hatch cover. Troop compartment personnel reacted positively to replacement of the present cover with the transparent cargo hatch cover. recommendations for refining the concept include a two-man bench seat for use with the cover, an interior cover for proper light discipline, and procedures for reducing light reflection to a minimum.

RN 88-118 Increasing Bradley Fighting Vehicle Effectiveness: Improved Training Approaches and Equipment, Rollier, R.L.; Knapp, S.D.; Frederick, D.P.; Champion, D.F.; Roberson, P.R.; Salter, M.S. July 1988. (AD A210 604) Nine issues that affect the combat effectiveness of the Bradley Fighting Vehicle (BFV) are discussed in this report. All of them were selected for development and evaluation work. The general findings for each area indicate the following: (a) a thermal training package can enhance individual and unit capability during limited visibility conditions, (b) a modified range card may be easier to use than the existing BFV cards, (c) an optical range finder can provide the dismount element of the BFV with an accurate, low-cost range estimatation tool to aid in employing infantry weapons systems, (d) synthetic thermal barrier materials may be able to prevent combat vehicles from being detected by threat thermal devices, (e) a 25-mm on-board ammunition stowage container can increase survivability of the BFV, reduce loading times, and increase vehicle stowage capacity, (f) a 7.62-mm coaxial machine gun mount pin can virtually eliminate loss of pins and can increase the availabilty of BFVs, (g) a transparent cargo hatch prototype can be built and installed on BFVs to increase visibility from the squad compartment, allow forward observer tasks to be performed, and reduce motion sickness and claustrophobia, (h) a proposed silent generator concept can provide a means of ensuring combat readiness by keeping critical BFV combat systems ready for immediate response during silent watch

missions, and (i) a driver alert system can allow the BFV commander to wake a sleeping or inattentive driver and alert hin to imminent vehicle movement.

RN 88-119 Review and Analysis of BIFV Operations Under All Visibility Conditions, Rollier, R.L.; Salter, M.S.; Perkins, M.S.; Bayer, G.C.; Strasel, H.C.; Lockhart, D.C.; Kramer, A.J.; Hilligoss, R.E. August 1988. (AD A209 825) This report discusses the results of a problem analysis conducted as the initial step of a multiyear research effort. Researchers analyzed Bradley doctrine, tactics, techniques, and training, with particular empasis on reduced visibility operations. The problem analysis phase identified areas where the Bradley's combat effectiveness could be enhanced. Recommended solutions to some of the problems are presented. For other problems, directions for future research are detailed. This report provides background and guidance for ongoing Bradley research.

RN 88-120 A Technique for Classifying Vehicular Targets as Either Frontal or Flank Views for Use in Range Estimation and Application of Lead Rules for the Bradley Fighting Vehicle, Perkins, M.S. July 1988. (AD A211 793) In efforts to improve range estimation accuracy for the Bradley Fighting Vehicle, this report describes development of a technique to classify vehicular targets as either frontal or flank views and modification of a quick reference table to be used as a job performance aid. The target-view classification technique will allow more effective use of the quick reference table for range estimation, more accurate use of the ranging stadia on the auxiliary sight unit, and application of lead rules for engaging flank views of moving targets. The target-view classification technique and the modified quick reference table will be included in the BFV Gunnery field manual (FM 23-1).

RN 88-121 Cost-Effective Automation of Army Classroom Training: A Case Study, Thoreson, R.W. September 1988. (AD A211 748) This report uses the Equipment Records and Parts Specialist (76C10) Course to prevent a method for planning cost-effective automation of Army classroom training. Average costs per trained soldier were collected. Because almost all costs in this course vary with the length of time for training, cost-effective automation is described as more efficient use of classroom time. The analysis includes a description of current Army policy as it lowers the cost of future computer applications by equipping classrooms with computers for hands-on simulation of automated job tasks. Classroom cost and productivity curves are defined, hour by hour, during lock-step instruction and then combined to define marginal cost per trained soldier. Classroom costs are calculated from existing budgetary data, but productivity is empirically measured. The analysis estimates cost savings if instructional software can shorten training time and illustrates how classroom productivity curves can be used to target computer applications with greatest impact on training time and cost.

RN 89-01 Manpower and Personnel Standardization Language for Army Systems, Barber, J.L.; Hetler, D.W.; Jones, R.E., Jr. January 1989 (AD A206 016) Of the six technical domains in the Army MANPRINT program, only two (manpower and personnel) are not comprehensively covered by military standards and specifications. This report contains language that, if added to some standard or specification, would place manpower and personnel on the same footing within the Department of Defense Standardization Program as the other four MANPRINT domains (training, safety, human factors engineering, and health hazards).

The report proposes two feasible alternatives for adding this language to existing standardization documents (including data item descriptions). This report is intended to document the MANPRINT requirements for manpower and personnel in system development, where the focus is on operability and battlefield effectiveness (not system supportability, as in integrated logistics support).

RN 89-02 Target Acquisition and Analysis Training System: Effects on Combat Vehicle Identification (CVI) Performance of Number of Vehicles Trained, Training Frequency, and Soldier Trainability, Smith, N.D.; Heuckeroth, O.H.; Warnick, W.L.; Essig, S.S. January 1989 (AD A206 500) Three groups composed of 27, 26, and 25 soldiers each, matched on GT scores, were given repeated training on varying numbers of vehicles taken from the Basic CVI Training Program (GTA 17-2-9). One group was trained on two modules of five vehicles each (10), a second on three modules (15) and a third on four modules (20). The training took place on each of three days. The training required, on the average, 25 minutes to train each module of five vehicles. The four-module group received four repetitions during the three days (total of 6.7 training hours) while the 2- and 3-module groups received six repetitions (5 hours and 7.5 training hours respectively). An initial pretraining test was given, followed by posttraining tests administered at the completion of each training repetition. The tests consisted of having the soldiers identify projected slides of each vehicle. Three views (front, oblique, side) of each vehicle were randomly presented.

Earlier research with the CVI program (Shope et al., in preparation) demonstrated a significant relationship between recognition and identification (R&I) performance and specific vehicle parts vocabulary. A test [the Verbal Cue Recognition (VCR) test used by Shope] was administered in this research before the pretraining test. Comparison of the VCR scores for these three groups showed a lack of balance; hence, a sample of 15 soldiers was drawn from each group so that those groups were now balanced (matched) on both GT and VCR test scores. When 200 minutes of training time were allocated to learning 20 vehicles, the results indicated that two 50-minute training sessions teaching vehicles 1-10 followed by two 50-minute training sessions teaching vehicles 11-20 (total training time of 200 minutes) yielded a mean of 33.7 vehicle slides correctly identified, versus 29.7 slides for the group tested after receiving two 100-minute sessions teaching vehicles 1-20 (total time also 200 minutes). The same pattern existed when 300 and 400 minutes of training time were allocated.

The initial sample group of 78 soldiers was divided into "low" and "high" achievers based on their relative performance on the first posttraining test. In each of three vehicle groups, the mean percentage of slides identified by the "high" achievers on their first repetition was not reached by the "low" achievers until their fourth training repetition.

The report suggests the following:

- Although additional research is required to conclusively establish the effects of overlearning on retention of this type of material, training of no more than 10 different vehicles per training session is more effective than training that addresses more than 10 vehicles per session.
- Some soldiers have extreme difficulty learning to recognize and identify vehicles even after lengthy training. Consideration should be given to using a selective procedure, such as test scores following a single training session on the Basic CVI training Program, to determine who should receive additional R&I training.

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RN 89-03 Human Factors and Safety Assessment of Army Systems, Avery, L.W.
January 1989 (AD A205 439) This report summarizes the human factors and safety assessment support provided to the U.S. Army Operational Test and Evaluations Agency (OTEA) during the planning and conduct of Follow-On Test and Evaluations (FOTE) of the M1A1 tank and the AN/TRC-170 Troposcatter Radio, the planning phase of the Mobile Subscriber Equipment (MSE) test, and the data collection phase of the SINCGARS V test. The findings of this report provide "lessons learned" for addressing MANPRINT issues during the operational testing of hardware systems. These "lessons learned" indicate ways MANPRINT can be better integrated into test planning and execution. Human factors and safety-related deficiencies that prevent fully satisfactory system performance are identified for the M1A1 tank and the AN/TRC-170 Radio.

RN 89-04 Design of a MANPRINT Tool for Predicting Personnel and Training Characteristics Implied by System Design, Dick, A.O.; Bittner, A.C., Jr.; Harris, R.; Wherry, R.J., Jr. January 1989 (AD A206 201) This report describes the development and design specifications for a software-based aid for Army system designers. The purpose of the aid is to evaluate a system design by determining the operator and maintainer characteristics required by that design to reach criterion system performance levels. The aid is an analytical, simulation-based approach that will predict the impact on total system performance of individual differences in cognitive and psychomotor performance and of new system technologies. The specification describes a system based on the Human Operator Simulator (HOS) IV. In this approach, HOS performance micromodels are to be built from the Army Research Institute's (ARI) Project A predictor data. Although the design specification described herein is not being developed any further by ARI, it may prove useful for other projects.

RN 89-05 Line of Sight-Forward (Heavy) Surrogate Assessment, Brown, F.D.; de-Pontbriand, R.J.; Frydendall, J.D. January 1989 (AD A205 528) The U.S. Army Air Defense Artillery School (USAADASCH) briefed the Forward Area Air Defense (FAAD) Line of Sight-Forward (Heavy) (LOS-F-H) concept at a mid-July 1986 Army Systems Acquisition Review Council meeting. The briefing called for a manpower and personnel integration (MANPRINT) assessment of the operability and supportability of the LOS-F(H)'s gun-missile or "hybrid" system. USAADASCH asked the Army Research Institute to conduct the MANPRINT assessments, and the Human Engineering Laboratory to provide support in its areas of specialty. Based on Manpower, Personnel, and Training assessments of one prototype or "surrogate" system from two manufacturers, it was found that operability and support requirements could be met by the anticipated transition MOS, 16R. Human factors engineering, system safety, and health hazard evaluations, while identifying specific areas of noncompliance and risk, uncovered no features in the prototype systems that invalidate the feasibility of the hybrid concept. Specific suggestions were made to help guide the planned LOS-F(H) Candidate Evaluation.

RN 89-06 Detailed Design Specification for Product 6: Personnel Characteristics Requirements Aid, Rossmeissl, P.G.; Wise, L.L.; Alderson, M.A. January 1989 (AD A207 091) The U.S. Army Research Institute (ARI) is developing a set of software-based aids for the evaluation of weapons system designs in terms of manpower and personnel requirements. This report is a detailed design specification for software that will determine

the operator and maintainer characteristics required to achieve a given weapons system's criterion performance. This specification includes a statistical analysis of ARI's Project A data base, equations that link scores on the Armed Services Vocational Aptitude Battery (ASVAB) to performance on tasks, and the interface design of the aid itself. Although the development of this design has not been funded, the design specification may prove useful for other projects.

RN 89-07 ARI V(INT)2 Soldier Machine Interface Demonstrator: Results of Experimentation on SIMNET-D, Pew, R.W.; Donahey, R.J.; Huggins, A.W.F.; Sidorsky, R.C. January 1989 (AD A205 437) This report presents some of the ways that applied expert system technology can be used to reduce the tremendous cognitive burden imposed on combat commanders in the data-rich, highly stressful Battlefield environment. The authors selected a tank platoon movement-to-contact in which an enemy force is ambushed to provide an early demonstration if some features of an 'expert' enhanced soldier-machine interface (SMI). Ten experienced tank platoon leaders participated in experimentation using one of the simulated M1 tank modules of the SIMNET-D facility at Fort Knox, KY. Navigation and maneuver performance was compared under two conditions: (1) using current paper procedures, and (2) using a computerized data management and display system incorporating expert system technology. The display system was based on a concept known as V(INT)2 (Vehicle Integrated Intelligence). A prototype version of the ARI V(INT)2 SMI Demonstrator (VSD) was used. Performance with the VSD system was superior with respect to several tactically significant variables.

RN 89-08 MANPRINT in the LHX: MANCAP Application to the Light Infantry Division, Lindquist, J.W.; Robinson, R.E.; Statler, L.H. January 1989 (AD A206 204) This effort further demonstrates the feasibility of using organizational modeling in the LHX (Light Helicopter, Experimental) program as an iterative tool to probe MANPRINT (Manpower and Personnel Integration) constraints that begin early in the system acquisition process. The effort was conducted as the second phase of a program to investigate and develop a top-down method to assess manpower, personnel, and training (MPT) for the LHX. The first phase, MANPRINT in LHX: Organizational Modeling Project, indicated that MANCAP (Manpower and Mission Capability), a top-down method of analysis that assesses MPT in terms of its contribution to mission capability, is feasible. It resulted in a prototype MANCAP model of the mission operation and attendant supply and maintenance activities for an aviation company-size unit. The purpose of the second phase is to extend the MANCAP method of analysis to a division-size organization, a Light Infantry Division (LTD), thereby including the intricacies of several different units performing a variety of missions with different equipment that place simultaneous demands on a wider spectrum of the combat service support structure. The model was exercised using LHX RAM goals to establish a base case LHX capability for the LID. Three sensitivity analyses were also investigated. Manpower resources for each case were reviewed in comparison with those authorized in the current LID. The capability of MANCAP to translate projected LHX RAM data into mission capability for a Light Infantry Division was demonstrated. MANCAP provides a rapid and flexible tool to estimate MPT impacts on system capability during early stages of the systems acquisition process. Overall, organizational modeling using LHX RAM goals suggests that if the LHX RAM goals are achieved, maintenance manpower reductions are possible for the LHX without significantly affecting mission capability.

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RN 89-09 An Analysis of Electronic Aids to Maintenance (EAM) for the Light Helicopter Family (LHX), Frederickson, E.W.; Lindquist, J.W.; Lemen, J.B. January 1989 (AD A205 440) Substantial savings in maintenance manpower and training time, special tools, test equipment, and the storage and handling of repair parts have been predicted for weapons systems that incorporate electronic aids to maintenance (EAM) in their design. Performance deficiencies of weapon system's EAM could have serious consequences to both system availability and MPT (manpower, personnel, and training) requirements. This report provides an overview of contemporary EAM technology. It identifies failures or inadequacies for EAM used in recent weapons systems and projects the results of EAM performance for the Light Helicopter Family (LHX). It also identifies MPT-related solutions relevant to the use of EAM in the LHX program.

RN 89-10 Detailed Design Specification for Product Three—Significant Soldier Characteristics, Jackson, K.; Varhol, P.; Rose, A.; Rigg, K. January 1989 (AD A205 436) This report represents a detailed design specification for a computerized aid that estimates the characteristics of personnel likely to be available to man a weapons system before it has been fully designed. The aid deals with two classes of human characteristics, those that are MOS dependent, and those that are not. MOS-dependent characteristics, are usually related to cognitive skills; MOS-independent characteristics are those related to size, strength, and perception. This aid was developed using the Revelation data base management system. It contains software architecture, data requirements, and interface design. This design specification, one of several that are part of a larger U.S. Army Research Institute research program, will not be developed, but it may prove useful for other projects.

RN 89-11 Factors Influencing Army Maintenance, Evans, D.C.; Roth, J.T. January 1989 (AD A205 982) Factors and variables that influence maintenance for systems and related manpower, personnel, and training (MPT) characteristics were identified in a review of literature . The results of the literature review were used to develop several conceptual models to support early investigation of the potential effects on maintenance MPT characteristics of decisions early in the acquisition process. The models developed include a maintenance demand factors model that identifies the factors that potentially influence system maintenance burden; a maintenance driver factors models that relates the joint, propagated consequences of early acquisition decisions on later system characteristics important to maintenance; a maintenance process model that identifies actions and decisions generic to all levels and types of maintenance; and two acquisition influence models, one for the Accelerated System Acquisition Process (ASAP) and one for Non-Development Item (NDI) acquisitions, that relate the variables in the maintenance demand factors model to events in the two acquisition processes that can influence related characteristics of the fielded systems.

RN 89-12 MANPRINT-Related Research for the Imagery Intelligence Area, Pence, E.C.; Carter, A.L.; Barret, P.H., Jr. February 1989 (AD A205 981) This investigation addresses the need to identify potential MANPRINT-related research issues in the Army Imagery Intelligence (IMINT) Area and develop a research plan for studying those issues. Potential research issues were identified through the review of documents related to imagery intelligence and corps-level doctrine and through interviews with functional subject matter experts (SMEs) in the intelligence community. Following the identification of potential re-

search issues, the authors developed a research strategy to address the issues and a plan for a research demonstration in an imagery intelligence field exercise. The literature review and interviews with SMEs identified a number of MANPRINT-related issues. The issues were grouped into five categories of MANPRINT-related topics: (1) Manpower and Personnel; (2) Training; (3) Human Factors/Health Hazards; (4) Organizational Structure; and (5) Requirements Analysis. A sixth category, engineering and facilities, impacts on many of the MANPRINT-related factors. The IMINT MANPRINT-related issues and the research strategy identified in this effort provide a foundation for building a research program that supports decision makers in the intelligence community.

RN 89-13 Canceled.

RN 89-14 A Prototype Intelligent Tutoring System for Troubleshooting the M16A1 Automatic Rifle, Miller, M.L. March 1989 (AD A210 702) This report describes a research and development effort to investigate the feasibility of combining two new instructional technologies—intelligent tutoring systems and interactive videodisc-based courseware—into a single instructional vehicle operable on low-cost personal computers. Funded by the Army Research Institute through the Small Business Innovative Research Program, the project developed a demonstrable prototype that combines a rule-based expert system with a videodisc-based instruction delivery package for troubleshooting M16A1 automatic rifles.

RN 89-15 Enlisted Personnel Allocation System: Interim Progress Report, Konieczny, F.P.; Brown, G.; Hudson, R.; Hutton, J.; Stewart, J. March 1989 (AD A207 214) The Army Research Institute, with the assistance of the General Research Corporation, is undertaking a project to modernize and improve the way the Army determines the Military Occupational Specialty (MOS) for which an individual should be trained. This project is called the Development of the Enlisted Personnel Allocation System (EPAS). This report describes progress during the first half of the 7th year of the contract.

RN 89-16 Academic Skills for Non-Commissioned Officer Job Performance and Career Development, Gagne, E.D.; Hickey, D.T.; Rositol, M.A.; Campbell, R.; Dowd, K.J. April 1989 (AD A207 513) This report describes work carried out to address basic academic skill deficiencies of U.S. Army Non-Commissioned Officers. Researchers reviewed job task descriptions and interviewed Non-Commissioned Officers about on-the-job performance. They also reviewed Non-Commissioned Officer Education System lesson materials and tests, monitored classes, and interviewed instructors, course managers, and students. Findings will be used to develop programs of instruction, the objective of which will be to correct academic skill deficiencies of Army Non-Commissioned Officers.

RN 89-17 Identification of Variables Determining Intrahemispheric Interference Between Processing Demands, Green, J. April 1989 (AD A208 435) This research note describes basic research aimed at understanding principles of brain hemisphere functioning which can be used to improve human performance. The research is most relevant for understanding performance based on visual information perceived by peripheral vision, and examines how intrahemispheric interference affects performance degradation when two task-related activities depend on the same hemisphere of the brain. It was found that even in

apparently simple tasks, small changes increasing or decreasing the difficulty of cognitive decision making are very powerful in determining how interactions within hemispheres will affect performance. When intrahemispheric interference occurred, changes in response requirements simplifying the decisional processes necessary to organize the response served to reduce interference. Effects of intrahemispheric interference may reduce performance based on stimuli in a particular location, or reduce it by one hand relative to the other. There are individual differences in the magnitude of intrahemispheric interference and its effects degrading performance as well.

RN 89-18 The Relationship of Training and Personnel Factors With Combat Performance, O'Mara, F.E. May 1989 (AD A209 945) This research was intended to support ARI's research program on the determinants of combat performance by conducting preliminary analyses on the relationship of unit personnel and training factors to simulated combat performance at the National Training Center (NTC). These early findings will then serve to guide the more extensive data analysis to occur later in this research. Questionnaire and interview data were collected from a sample of 31 platoons in the same brigade shortly before their rotation to the NTC. These measures concentrated on unit leadership, cohesion and morale, unit training, and particular personnel characteristics of the unit (e.g., unit turnover).

RN 89-19 Tactical Scenarios for Use With the Tactical Staff Training Module, Carter, C.F., Jr.; Ross, C.G. May 1989 (AD B133 695) This report documents the development and application of four tactical scenarios to support training of Army divisional-level staff officers in the analysis of the battlefield area. The emphasis is upon terrain analysis. The scenarios are intended for use with prototype training software called the Tactical Staff Training Module.

RN 89-20 Application of Computers To Learning in the Command and General Staff College: Assessment of Computer Literacy in CGSC, Hudson, D.L.; Osborn, M.M.; Spangenberg, L.M.; Thorn, C.T.; Trainor, M.S. May 1989 (AD A209 823) A Front End Analysis was conducted regarding the expansion of the use of computers in instruction at the United States Army Command and General Staff College (CGSC). This task, supporting the front end analysis, focused on the assessment of computer literacy in the student, staff, and faculty populations of the CGSC. The results of this survey provide valuable information regarding the pace and sequence of integration of computers into the CGSC curricula. The methodology used here was to construct a questionnaire asking questions regarding an individual's background with computers and to have the evaluation group of the CGSC administer the questionnaire. A total of 696 questionnaires was completed was completed. Major findings were (1) the faculty displayed a lower level of computer literacy than the students, (2) most of those sampled had some hands-on computer experience, with the most dominant application being word processing, (3) most did not have experience learning via a computer-assisted instruction lesson, and (4) the major field in college did influence the degree of computer literacy. This report presents the findings and recommendations of Task C-3 of the Front End Analysis. Related reports are separately bound. The reports all have the beginning title, Application of Computers to Learning in the Command and General Staff College. The follow-on headings for the other reports are:

Front End Analysis Study
CGSC Analysis
Analysis of Staff Officer Knowledge, Skills, and Abilities
Assessment of Computers in Education at Various Institutions
Technology Assessment
Analysis of Institutional and Financial Constraints
Army Command and Control Concepts Study
Comparison of Knowledge, Skills, and Abilities to CGSC Learning Objectives Identification of Computer Opportunities.

RN 89-21 Education and Training: 2010 and Beyond, Farr, M.J.; Perez, R.S. May 1989
(AD A213 173) This research note seeks to forecast scientific and technological advances in neuropsychology, neuroscience, biotechnology, cognitive psychology, and sociotechnology that may affect the way the Army educates and trains its personnel in the year 2010 and beyond. Eight papers were written by civilian scientists to identify potential breakthroughs. The papers were reviewed by a panel of civilian and military specialists to further focus on training and organizational implications. A two-day symposium was held whereby the authors presented their papers. Three separate workshops also were held at the symposium to address training and organizational issues derived from three possible future scenarios: predominant use of combat robotics, human soldier enhanced by automation, and soldier with enhanced human capabilities. Although a number of these issues were raised during the two-day symposium, three major recommendations were made:
(1) to adequately address the training and organizational challenges that new breakthroughs may bring, ARI needs a multi-disciplinary staff made up of neuroscientists, computer scientists, robotic specialists, and sociotechnologists in addition to its regular staff of behavioral and social scientists
(2) to train both the professional workforce and the soldiers who operate and maintain complex equipment, the use of intelligent tutoring systems warrants serious consideration, and
(3) to ensure an effective integration of work performed by humans, robots, and other intelligent systems, training research on appropriate function/task allocation is needed.

RN 89-22 Effects of Stress on Judgment and Decision Making in Dynamic Tasks,
Hammond, K.R. May 1989 (AD A210 605) Studies of expert microburst forecasters were conducted. Two studies yielded results confirming the validity of a linear model of expert judgment and the meaningfulness of profiles as representations of weather phenomena. A simulation demonstrated
that a simple scientifically and empirically ignorant forecasting model could perform as well as a sophisticated scientifically informed algorithm. A study conducted under dynamic and highly representative forecasting conditions yielded the following major findings: (a) agreement on precursor values was low to moderate, setting the possible upper limit on forecasting accuracy; (b) agreement on microburst probabilities was lower under the highly representative situation than in our "best case scenario" study; and (c) new information received over time had very little impact on the experts' judgments.

RN 89-23 Constraints on Access: Cost and Benefits (Spontaneous Memory for Relevant Experiences), Franks, J.J.; Bransford, J.D. May 1989 (AD A208 562)

Research Notes

This research note describes a program examining the phenomena of spontaneous access, using different nondirected access paradigms. When presenting subjects with a potential transfer task following some acquisition experience where spontaneous access is impeded, later access to the acquisition experience can be disrupted. The processes that people engage in during the first transfer test are re-invoked during a second test, and this interferes with retrieval of acquisition information even when people are explicitly directed to try to retrieve the original information. Furthermore, this interference is quite specific to information in the first transfer test. Successful spontaneous access and use of prior acquisition experiences are facilitated in situations that instantiate the transfer appropriate processing principle. Problem-oriented processing during acquisition enhances subsequent problem solving in cases where fact-oriented processing of the same acquisition information does not. Work with the classification paradigm provides further support for the importance of transfer appropriate processing in (OVER) spontaneous access. The findings indicate that not only similarity in the situational "conditions," but—at least as importantly—similarity in people's intentions and actions are vital to successful access.

RN 89-24 Military Occupational Specialty (MOS) Restructuring: An Annotated Bibliography, Shipman, M.G.; Finley, D.L. June 1989 (AD A210 718) Technical reports, regulations, and program descriptions concerning how to restructure Military Occupational Specialties (MOS) were reviewed. Manpower, personnel, and training issues were dealt with in the literature. Approaches to task analysis that may be helpful in the allocation of tasks to MOS were included in the review. Currently available procedures generally deal with MOS aggregation and restructuring at a macro level. Areas reviewed are in the developmental stage and have not been used in a MOS restructuring action.

RN 89-25 Cohesion as a Deterrent to Stress for Rotational Deployment Units, Thompson, T.J.; Valentine, P.J.; Dewey, G.I. May 1989 (AD A209 266) This research note was prepared in response to a request from the 82d Airborne Division to identify ways to reduce casualties and overall levels of unit stress. The Ft. Benning Field Unit of ARI is responsible for leading the research efforts on Light Infantry tactics and doctrine. The mission of light infantry units, particularly those that are airborne, demands that all soldiers are at the peak of readiness. One apparent deterrent to readiness is the buildup of stress over extended periods of time. In this research note, a stress management program is presented which, when properly applied, will reduce overall stress levels in units tasked with rotational deployment preparedness.

RN 89-26 Application of Computers To Learning in the Command and General Staff College: Army Command and Control Concepts Study, Littlefield, D.R. May 1989 (AD A208 756) This research note reports on a front end analysis conducted on the expansion of computer use in instruction at the Army Command and General Staff College (CGSC). As a portion of the analysis, a conference was held to canvass informed, experienced Army leaders on anticipated changes in doctrine, organization, or technology that might cause modifications in commander-staff relations, or in staff operations, which might then have to be reflected in future CGSC instruction, or in combat developments. This report discusses that conference, and presents the findings and recommendations of Task E of the front end analysis,

and is part of a series of ten reports called "Application of Computers to Learning in the Command and General Staff College:".

RN 89-27 Training and Human Factors Research in Military Systems: A Final Report, Babbitt, B.A.; Muckler, F.A.; Seven, S.A. May 1989 (AD A210 217) This document summarizes the technical activities conducted by personnel of the Essex Corporation in support of the work performed by the U.S. Army Research Institute, Fort Hood Field Unit, from 1 December 1982 to 30 November 1987. Three major tasks were involved: (1) Human factors technical support was provided for 26 operational tests and evaluations, including tests of vehicles; weapons systems; communications systems; and command, control and intelligence systems. (2) Training research was conducted on combat vehicle identification (CVI) training under the Target Acquisition and Analysis Training Systems (TAATS) project, including work on advanced thermal sight training and comparative media experimental studies for CVI materials. (3) Methodologies to improve human factors operational tests and evaluations were developed.

RN 89-28 Canceled.

RN 89-29 Demonstrating the Applicability of Simulation Modeling to Resource Allocation in the 63W10 Course, Kessler, J.J. June 1989 (AD A210 172) This report describes a preliminary effort to apply simulation modeling software to resource allocation in the 63W10 (Wheel Vehicle Repairer) training course. The effort was conducted as part of the Training Technology Field Activity (TTFA) program. Two preliminary models of course operation were built using Micro SAINT software. The report concludes that the complexity of scheduling equipment, instructors, and classes would be significantly eased by software such as Micro SAINT and that improvement in resource allocation depends on scheduling capability. Micro SAINT, however, was seen to lack the input/output interface needed for interactive model operation.

RN 89-30 Methods for Planning Unit and Displaced Equipment Training as Applied to the Light Helicopter Family, Lindquist, J.W.; Robinson, R.E.; Statler, L.H. June 1989 (AD A210 216) This project investigates and develops a training scheduling method for application during the material acquisition process. The method developed is a four-step process in which the analyst employs and interacts with an automated model of the training process to develop and refine alternative training schedules to ultimately arrive at an optimal training schedule within a given set of resource constraints. The four steps are (1) training requirements identification, (2) model development, (3) model application, and (4) analysis and comparison of training schedule alternatives. The results is a viable training schedule or set of alternative schedules for introducing a new weapon system into the Army force structure. The project develops prototypes for the method by devising a schedule for initial unit training on receipt of new LHX equipment (not sustainment training) and develops a displaced equipment training (DET) program for units receiving the AH-IS and OH-58 aircraft displaced by the LHX. The unit training schedule commences in November 1995 with the initial production of the LHX helicopter and continues through January 2005. The schedule plans training for 185 active and reserve component units, with the active duty units requiring an average unit training time of 17.57 weeks and the reserve component units requiring an

average training time of 89 weeks. The DET program is a 10-week program that enables a National Guard unit to complete DET without any additional active duty training time but is flexible enough to use active duty time when and if it is made available.

RN 89-31 An Annotated Bibliography of Defence, Disarmament, and Peace, Hartley, K.; Hooper, N. June 1989. (AD A210 701) This final report contains an annotated bibliography of topics pertaining to defence, disarmament, and the peace process. Major issues highlighted in the document include military tactics; macroeconomics; national studies; developing countries; international trade; microeconomics for research, development, and procurement; manpower concerns (conscription vs. volunteer force, efficiency, cost, and levels); and disarmament (arms limitation and size of forces). A related annotated bibliography of papers from the Stockholm International Peace Research Institute Yearbook is included.

RN 89-32 Judging Samples of Command Post and Field Training Exercise Messages, Solick, R.E.; Liebhaber, M.J.; Obermayer, R.W.; Linville, J.J.; Obermayer, A.H. June 1989. (AD A219 967) This report documents the performance of a computer-administered measurement instrument. This instrument, MsgJudge, presents messages from two environments to a panel of expert judges and collects data in the form of responses to semantic scales, forced-choice questions, and a summary questionnaire. Radio transmissions from a Battalion Command Net and from a Task Force Command Net were transcribed. Transcription included removal of call sign and most procedural words. The individual messages were then presented to experts, who were asked to rate them on a scale with bi-polar adjectives at either end. These adjectives were selected to allow the expert to rate the message in the areas of evaluation, potency, activity, and style. The rater was then asked to decide whether the message came from a Field Training Exercise (FTX) or from a Command Post Exercise (CPX). The raters chose correctly between FTX and CPX when presented with that forced choice. Use of the bi-polar adjectives on a semantic differential scale also indicated the correct identification of the source. This report presents the data collected in a pilot test of the instrument. The data will be used to select experimental parameters for later use of the instrument to examine the factors that distinguish command post exercises from field exercise messages. the pilot results indicate that both the number of response scales and the number of messages may be reduced in subsequent experiments without reducing the power of the instrument.

RN 89-33 HARDMAN II Applied to the Forward Area Air Defense Line of Sight-Forward (Heavy), Shvern, U.; Stewart, J.E. II. June 1989. (AD A210 533) The Manned Systems Group of the U.S. Army Research Institute is responsible for the development of analytical methods in support of the Army's MANPRINT (Manpower and Personnel Integration) initiative. This report deals with the trail application of HARDMAN II, an automated derivative of Hardman (Hardware vs. Manpower) analysis to the Forward Area Air Defense (FAAD) Line of Sight-Forward (Heavy) (LOS-F(H)) system. The analyses were conducted to test the HARDMAN II methodology in a situation where data requirements were minimally met and where time constraints were severe. Another objective was to provide decision makers with timely input in the form of workload-driven maintenance manpower estimates for LOS-F(H), thus demonstrating its utility as a MANPRINT tool. Results showed that manpower requirements would be adequate only if the Built-In Test (BIT) equipment met required performance specifications. At more realistic levels of BIT performance, it was demonstrated

that for each LOS-F(H) battery of 12 systems, a total of five Military Occupational Specialty (MOS) 24X systems mechanics would be required instead of the four originally called for.

RN 89-34 Human Factors Performance Data for Future Forward Area Air Defense Systems (FAADS), Babbitt, B.A.; Muckler, F.A.; Seven, S.A. June 1989. (AD A210 425) This research documents the collection, organization, and analysis of MANPRINT-related data from the 1985, an extensive follow-on evaluation was conducted of the Sgt York system. Due to the use of an automated digital data bus, a large quantity of objective system and subsystem data was recorded. Included in these data was a substantial amount of previously uninvestigated individual and crew performance data. The data yielded findings on many issues relevant to the design of FAADS. The report provides suggestions on applying the performance data to future soldier-system performance models. Such models can be remarkably helpful in making decisions about future FAADS. Recommendations are also given on how to improve future follow-on evaluations.

RN 89-35 Improvement in Command Group Performance as a Result of Diagnostic Feedback and CATTS Training, Thomas, G.S.; Barber, H.F.; Kaplan, I.T. June 1989. (AD A210 723) Five battalion command groups participated in four 1-day CATTS exercises. Performance on the first and last exercises was compared. Researchers measured information reception and transmission by group members during planning (information flow questionnaire); information exchange by staff members during battle execution (probes); degree of success on the simulated battlefield (mission accomplishment scores); and BCG ARTEP performance as assessed by CATTS controllers, player-controllers, and the players themselves (subjective ratings). Feedback concerning performance was provided after each day's training. All measures of performance increased significantly from first day to fourth day. Battalion command group performance on an information flow measure during both planning and execution and performance on the battlefield improved as a result of CATTS training. Since performance did not increase in an earlier similar experiment where no feedback was provided, it is likely that the feedback sessions contributed substantially to the increase in performance observed in this research. The subjective ratings of ARTEP performance observed in the current research were greater than those in the previous research.

RN 89-36 Battle Simulation Outcomes as Potential Measures of BCG Performance in CATTS Exercises, Thomas, G.S. June 1989. (AD A210 532) Ten Battalion Command Groups consisting of a battalion commander, an S1, S2, S3, S4, four company commanders, and roughly ten supporting staff members were exercised on the CATTS battle simulator. CATTS provides a considerable quantity of battle status data so it is possible to compute loss exchange ratios, relative exchange ratios, surviving maneuver force ratio differentials, command and control index of lethality ratios, and change in combat ratios—all of which are considered battle outcome measures when computed at the end of the battle. Results showed that, although all measures were calculated from the same battle data, correlations between them were not always high (.96 to .02) and were sometimes negative (-.35 to -.19) Attempts to relate performance measures to battle outcome measures were unsuccessful and in the case of subjective evaluations by controllers, there was reason to believe that the data were contaminated by the controllers' dual roles as evaluators and training event controller.

More research and higher quality data will be required to better evaluate the relationship between battle outcome measures, and between those measures and task performance.

RN 89-37 Making MANPRINT Count in the Acquisition Process, Metzler, T.R.; Lewis, H.V. June 1989 (AD A210 531) The Manpower and Personnel Integration (MANPRINT) program is a comprehensive management and technical effort that focuses on the continuous integration of the six MANPRINT domains (Human factors engineering, manpower, personnel, training, system safety, and health hazards) into the Material Acquisition and Development Process (MADP). In this report, the implementation of MANPRINT during the acquisition of the Airborne Target Handover System/Avionics Integration (ATHS/AI) for the Apache (AH-64A) aircraft is described, and the contribution of MANPRINT concepts to the definition of the system's performance requirements is detailed. Researchers concluded that using MANPRINT concepts in the acquisition of the ATHS/AI for the AH-64A helped to define a system that should reduce crew task times, number of crew procedures, and maintenance complexity. As a historical overview of the procurement of the ATHS/AI for the AH-64A, the report describes how MANPRINT issues influenced the initial Product Improvement Program (PIP) and the Engineering Change Proposal (ECP) and describes how MANPRINT concepts were conveyed in the Request for Proposal (REP). The application of MANPRINT in the Source Selection Process (SSP) is described and the lessons learned from this experience are summarized. These lessons are strategies that are potentially useful to other MANPRINT practitioners.

RN 89-38 An Assessment of the Ability of Maintenance and Logistic Models To Support Research on Early Estimation, Roth, J.T. June 1989 (AD A210 649) This research note describes an assessment of several existing logistic and maintenance estimation techniques and modeling approaches was conducted to evaluate their suitability for supporting exploratory research into the development of tools for assisting in the minimization of maintenance burden for existing and future material systems. A conceptual model of factors influencing maintenance demand was used as a baseline against which to evaluate the selected modeling approaches. The existing approaches evaluated were determined to be highly resource and time-intensive, which may make them less than optimum for near-term payoff research. An approach involving development and utilization of reduced-scale maintenance system models for exploratory research was described, and this approach was recommended for research support in maintenance demand minimization.

RN 89-39 Knowledge Elicitation: Phase I Final Report, Volume I, Leddo, J.M.; Mullins, T.M.; Cohen, M.S.; Bresnick, T.A.; Marvin, F.F.; O'Connor, M.E.. June 1989 (AD A209 932) Much of the previous work on knowledge eleicitation has been guided by requirements of the systems for which the elicited knowledge is to be encoded. The present paper reports a framework for knowledge elicitation and representation based on theories of how experts themselves represent knowledge. Two methodologies are presented: an interpretative method, based on the premise that experts organize knowledge in a "top-down" fashion; and a generative method, based on the premise that experts organize knowledge in a "bottom-up" fashion. The interpretative representation of expert knowledge integrates scripts scripts, object frames and mental modes. The generative representation integrates production rules, semantic nets and mental models. Knowledge elicitation techniques for each method are

selected and tailored according to knowledge requirements of these representations. Both the interprative and generative methods were tested, between subjects on ten situation development specialists and ten order of battle specialists in the Army intelligence domain. Knowledge models were constructed and evaluated for each of these two methods and intelligence specialties. Results show that experts do use a variety of knowledge structures in processing information and reasoning, that both interpretative and generative knowledge structures are necessary to capture adequately expert knowledge. In addition, the interpretative method seemed best at eliciting high-level goal and planning knowledge, while the generative method seemed best at eliciting situation specific rules and content knowledge. Situation development specialists tended to have more high-level and integrative knowledge while order of battle specialists tended to have more content knowledge. Discussion includes evaluating the strengths and weaknesses of the two methods plus suggestions for developing an improved integrated method.

RN 89-40 Effects of Different Control Mechanisms Upon Use of a Training Device, Shlechter, T.M. July 1989 (AD A212 979) This research examined the relative effects of different joystick systems ("Driver" and "Pacman") and different computer response times (2.5 seconds and 1.5 seconds) on soldiers' abilities to drive a vehicle on the Platoon-level Battlefield Simulation (PLBS) system. The Driver joystick system was designed so that all driving movements were made from the view of a hypothetical driver inside the vehicle. The Pacman control system design was similar to that of the Pacman game. Thirty-four subjects completed two different driving tasks across different routes on the PLBS terrain. The subjects used a different type of responding mechanism for each trial. The Pacman joystick configurations led to fewer driving problems and seemed easier to use than the Driver joystick configurations. Also, the subjects' verbal reports indicated that Pacman joystick configurations were easier to use than the Driver joystick configurations. Based on these findings, PLBS was equipped with a Pacman-style joystick configuration.

RN 89-41 Development of the AH-64A Display Symbology Training Module, Ruffner, J.W.; Coker, G.W.; Weeter, R.D. August 1989 (AD A213 456) To become fully qualified in the AH-64A attack helicopter, a student aviator must learn to identify and interpret the individual symbols presented on the helicopter's visual displays and to interpret the information provided by groups of symbols. This report describes work accomplished to develop a training module for teaching aviators to identify and interpret the symbology used on the AH-64A visual displays. The training module, known as the "Symbology Tutor," consists of an introductory section, a help system, and five lessons that provide instruction on the symbols contained in the AH-64A flight symbology set. The lessons cover symbols dealing with (a) position and movement, (b) attitude and altitude, (c) heading and navigation, (d) cueing and reference, and (e) weapons usage. Each lesson is divided into a tutorial and a quiz. Storyboards have been developed for each of the five lessons and are included in the appendixes of the report. Computer programs have been completed for the first two lessons. The report describes the completed portions of the Symbology Tutor and identifies the required computer hardware.

RN 89-42 The Basic Map Interpretation and Terrain Analysis Course (MITAC) Videodiscs, Terrell, D.J.; Miles, C.O. August 1989 (AD A213 302) To address deficiencies in low altitude navigation training, the map interpretation and terrain analysis

course (MITAC) was upgraded to a computer-based training format. This report describes the production, post-production, and duplication of a set of videodiscs to store the course content. An outline of the videodisc content and brief description of research and development plans for the Basic MITAC are presented.

RN 89-43 An Introduction to the Bradley Conduct of Fire Trainer: A Videotape, Salter, M.S. June 1989 (AD A212 056) The videotape described in this report was designed to be used as introductory classroom material for students receiving Bradley Fighting Vehicle (BFV) Conduct of Fire Trainer (COFT) gunnery training. The COFT, a computer-driven high fidelity precision gunnery training device, is of sufficient complexity that a standardized pretraining film was needed to orient students before hands-on instruction. This report details the rationale for and contents of the videotape and provides a copy of the script.

RN 89-44 Bradley Unit Conduct of Fire Trainer Instructor/Operator Procedures: A Videotape, Salter, M.S. June 1989 (AD A212 224) The videotape described in this report was designed to be used during Bradley Fighting Vehicle (BFV) Conduct of Fire Trainer (COFT) Instructor/Operator (IO) and Senior IO training at Fort Benning, GA. The tape highlights procedural differences in the Institutional COFT (I-COFT) at Fort Benning and the Unit COFT (U-COFT) found in Army units worldwide. This report details the rationale for and contents of the videotape and provides a copy of the script.

Research Products

RP 86-01 The 1985 Army Experience Survey: Tabular Descriptions of First-Term Separatees, Volume 1, Westat, Inc. January 1986. (AD A174 819) This document is one of a series of ten reports (Technical Report, Research Note, and Research Products) which provide background information on, descriptions of methodology for, and documentation of, the 1985 Army Experience Survey (AES). This report is Volume I of a two-volume set of crosstables describing first-term separatees from the U.S. Army. Tabulation volumes contain: an introduction to the AES report series; sections overviewing the project and methodology; and a chapter explaining how to read and interpret the tabulations. This text is supplemented by technical appendixes containing an annotated copy of the mail version of the AES instrument (Appendix A); the telephone version of the AES instrument (Appendix B); and coding schemes used to categorize responses to open-ended questions (Appendix C). The other major component of the tabulation volume is comprised of two-way tables of survey variables crossed with five banner variables. Volume I presents tables of selected survey items for first-term separatees with the following five banner variables: respondent gender, race, AFQT category, tables with five different banner variables: respondent gender, race, AFQT category, time since separating, and term of first enlistment. Volume II contains tables with five different banner variables: respondents' current residence (recruiting brigade), pre-Army education level, marital status at Army separation, military skill groupings, and perceived value of Army experience. Companion volumes are also available for three other separation groups, i.e., first-term attritees, mid-career separatees, and enlisted retirees. The complete list of reports is as follows:

RP 86-01. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Separatees, Volume I.

RP 86-02. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Separatees, Volume II.

RP 86-03. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Attritees, Volume I.

RP 86-04. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Attritees, Volume II.

RP 86-05. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Mid-Career Separatees, Volume I.

RP 86-06. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Mid-Career Separatees, Volume II.

RP 86-07. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Enlisted Retirees, Volume I.

RP 86-08. THE 1985 ARMY EXPERIENCE SURVEY: Tabular Descriptions of Enlisted Retirees, Volume II.

TR-700. *THE 1985 ARMY EXPERIENCE SURVEY:* Data Source Book and User's Manual.

RP 86-02 The 1985 Army Experience Survey: Tabular Descriptions of First-Term Separatees, Volume 2, Westat, Inc. January 1986. (AD A174 868) This document is one of a series of ten reports (Technical Report, Research Note, and Research Product) which provide background information on, descriptions of methodology for, and documentation of, the 1985 Army Experience Survey (AES). This report is Volume II of a two-volume set of

crosstables describing first-term separatees from the U.S. Army. Tabulation volumes contain: an introduction to the AES report series; sections overviewing the project and methodology; and a chapter explaining how to read and interpret the tabulations. This text is supplemented by technical appendixes containing an annotated copy of the mail version of the AES instrument (Appendix A); the telephone version of the AES instrument (Appendix B); and coding schemes used to categorize responses to open-ended questions (Appendix C). The other major component of the tabulation volume is comprised of two-way tables of survey variables crossed with five banner variables. Volume I presents tables of selected survey items for first-term separatees with the following five banner variables: respondent gender, race, AFQT category, time since separating, and term of first enlistment. Volume II contains tables with five different banner variables: respondents' current residence (recruiting brigade), pre-Army education level, marital status at Army separation, military skill groupings, and perceived value of Army experience. Companion volumes are also available for three other separation groups, i.e., first-term attritees, mid-career separatees, and enlisted retirees. The complete list of reports is as follows:

RP 86-01. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Separatees, Volume I.

RP 86-02. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Separatees, Volume II.

RP 86-03. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Attritees, Volume I.

RP 86-04. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Attritees, Volume II.

RP 86-05. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Mid-Career Separatees, Volume I.

RP 86-06. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Mid-Career Separatees, Volume II.

RP 86-07. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Enlisted Retirees, Volume I.

RP 86-08. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Enlisted Retriees, Volume II.

TR-700. *THE 1985 ARMY EXPERIENCE SURVEY*: Methodology and Recommendations for Future Administrations.

RN 86-01. *THE 1985 ARMY EXPERIENCE SURVEY:* Data Source Book and User's Manual.

RP 86-03 The 1985 Army Experience Survey: Tabular Descriptions of First-Term Attritees, Volume 1, Westat, Inc. January 1986. (AD A174 772) This document is one of a series of ten reports (Technical Report, Research Note, and Research Products) which provide background information on, descriptions of methodology for, and documentation of, the 1985 Army Experience Survey (AES). This is Volume I of a two-volume set of crosstables describing first-term attritees from the U.S. Army. Tabulation volumes contain: an introduction to the AES report series; sections overviewing the project and methodology; and a chapter explaining how to read and interpret the tabulations. This text is supplemented by technical appendixes containing an annotated copy of the mail version of the AES instrument (Appendix A); the telephone version of the AES instrument (Appendix B); and coding schemes used to

categorize responses to open-ended questions (Appendix C). The other major component of the tabulation volume is comprised of two-way tables of survey variables crossed with five banner variables. Volume I presents tables of selected survey items for first-term attritees with the following five banner variables: respondent gender, race, AFQT category, time since separating, and term of first enlistment. Volume II contains tables with five different banner variables: respondent gender, race, AFQT category, time since separating, and term of first enlistment. Volume II contains tables with five different banner variables: respondents' current residence (recruiting brigade), pre-Army education level, marital status at Army separation, military skill groupings, and perceived value of Army experience. Companion volumes are also available for three other separation groups, i.e., first-term separtees, mid-career separatees, and enlisted retirees. The complete list of reports is as follows:

RP 86-01. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Separatees, Volume I.

RP 86-02. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Separatees, Volume II.

RP 86-03. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Attritees, Volume I.

RP 86-04. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Attritees, Volume II.

RP 86-05. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Mid-Career Separatees, Volume I.

RP 86-06. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Mid-Career Separatees, Volume II.

RP 86-07. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Enlisted Retirees, Volume I.

RP 86-08. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Enlisted Retirees, Volume II.

TR-700. *THE 1985 ARMY EXPERIENCE SURVEY:* Methodology and Recommendations for Future Administrations.

RN 86-01. *THE 1985 ARMY EXPERIENCE SURVEY:* Data Source Book and User's Manual.

RP 86-04 The 1985 Army Experience Survey: Tabular Descriptions of First-Term Attritees, Volume 2, Westat, Inc. January 1986. (AD A174 861) This document is one of a series of ten reports (Technical Report, Research Note, and Research Products) which provide background information on, descriptions of methodology for, and documentation of, the 1985 Army Experience Survey (AES). This is Volume II of a two-Volume set of crosstables describing first-term attritees from the U.S. Army. Tabulation volumes contain: an introduction to the AES report series; sections overviewing the project and methodology; and a chapter explaining how to read and interpret the tabulations. This text is supplemented by technical appendixes containing an annotated copy of the mail version of the AES instrument (Appendix A); the telephone version of the AES instrument (Appendix B;) and coding schemes used to categorize responses to open-ended questions (Appendix C). The other major component of the tabulation volume is comprised of two-way tables of survey variables crossed with five banner variables. Volume I presents tables of selected survey items for first-term attritees with the following five banner variables: respondent gender, race, AFQT category, time since separating, and term of first enlistment. Volume II contains tables with five different banner variables:

respondents' current residence (recruiting brigade), pre-Army education level, marital status at Army separation, military skill groupings, and perceived value of Army experience. Companion volumes are also available for three other separation groups (i.e., first-term separatees, mid-career separatees, and enlisted retirees. The complete list of reports is as follows:

RP 86-01. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Separatees, Volume I.

RP 86-02. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Separatees, Volume II.

RP 86-03. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Separatees, Volume I.

RP 86-04. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Attritees, Volume II.

RP 86-05. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Mid-Career Separatees, Volume I.

RP 86-06. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Mid-Career Separatees, Volume II.

RP 86-07. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Enlisted Retirees, Volume I.

RP 86-08. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Enlisted Retiress, Volume II.

TR-700. *THE 1985 ARMY EXPERIENCE SURVEY:* Methodology and Recommendations for Future Administrations.

RN 86-01. *THE 1985 ARMY EXPERIENCE SURVEY:* Data Source Book and User's Manual.

RP 86-05 The 1985 Army Experience Survey: Tabular Descriptions of Mid-Career Separatees, Volume 1, Westat, Inc. January 1986. (AD A174 857) This document is one of a series of ten reports (Technical Report, Research Note, and Research Products) which provide background information on, descriptions of methodology for, and documentation of, the 1985 Army Experience Survey (AES). This report is Volume I of a two-volume set of crosstables describing mid-career separatees from the U.S. Army. Tabulation volumes contain: an introduction to the AES report series; sections overviewing the project and methodology; and a chapter explaining how to read and interpret the tabulations. This text is supplemented by technical appendixes containing an annotated copy of the mail version of the AES instrument (Appendix A); the telephone version of the AES instrument (Appendix B); and coding schemes used to categorize responses to open-ended questions (Appendix C). The other major component of the tabulation volume is comprised of two-way tables of survey variables crossed with five banner variables. Volume I presents tables of selected survey items for mid-career separatees with the following five banner variables: respondent gender, race, AFQT category, time since separating, and term of first enlistment. Volume II contains tables with five different banner variables: respondents' current residence (recruiting brigade), pre-Army education level, marital status at Army separation, military skill groupings, and perceived value of Army experience. Companion volumes are also available for three other separation groups, i.e., first-term separatees, first-term attritees, and enlisted retirees. The complete list of reports is as follows:

RP 86-01. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Separatees, Volume I.

RP 86-02. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Separatees, Volume II.

RP 86-03. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Attritees, Volume I.

RP 86-04. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Attritees, Volume II.

RP 86-05. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Mid-Career Separatees, Volume I.

RP 86-06 *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Mid-Career Separatees, Volume II.

RP 86-07. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Enlisted Retirees, Volume I.

RP 86-08. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Enlisted Retireees, Volume II.

TR-700. *THE 1985 ARMY EXPERIENCE SURVEY:* Methodology and Recommendations for Future Administrations.

RN 86-01. *THE 1985 ARMY EXPERIENCE SURVEY:* Data Source Book and User's Manual.

RP 86-06 The 1985 Army Experience Survey: Tabular Descriptions of Mid-Career Separatees, Volume 2, Westat, Inc. January 1986. (AD A175 729) This document is one of a series of ten reports (Technical Report, Research Note, and Research Products) which provide background information on, descriptions of methodology for, and documentation of, the 1985 Army Experience Survey (AES). This report is Volume II of a two-volume set of crosstables describing mid-career separatees from the U.S. Army. Tabulation volumes contain: an introduction to the AES report series; sections overviewing the project and methodology; and a chapter explaining how to read and interpret the tabulations. This text is supplemented by technical appendixes containing an annotated copy of the mail version of the AES instrument (Appendix A); the telephone version of the AES instrument (Appendix B); and coding schemes used to categorize responses to open-ended questions (Appendix C). The other major component of the tabulation volume is comprised of two-way tables of survey variables crossed with five banner variables. Volume I presents tables of selected survey items for mid-career separatees with the following five banner variables: respondent gender, race, AFQT category, time since separating, and term of first enlistment. Volume II contains tables with five different banner variables: respondents' current residence (recruiting brigade), pre-Army education level, marital status at Army separation, military skill groupings, and perceived value of Army experience. Companion volumes are also available for three other separation groups, i.e., first-term separates, first-term attritees, and enlisted retirees. The complete list of reports is as follows:

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RP86-04. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Attritees, Volume II.

RP86-05. THE ARMY EXPERIENCE SURVEY: Tabular Descriptions of Mid-Career Separatees, Volume I.

RP 86-06. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Mid-Career Separatees, Volume II.

RP86-07 . *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Enlisted Retirees, Volume I.

RP86-08. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Enlisted Retirees, Volume II.

TR-700 *THE 1985 ARMY EXPERIENCE SURVEY:* Methodology and Recommendations for Future Administrations.

RN 86-01 *THE 1985 ARMY EXPERIENCE SURVEY:* Data Source Book and User's Manual.

RP 86-07 The 1985 Army Experience Survey: Tabular Descriptions of Enlisted Retirees, Volume 1, Westat, Inc. January 1986. (AD A175 728) This document is one of a series of ten reports (Technical Report, Research Note, and Research Products) which provide background information on, descriptions of methodology for, and documentation of, the 1985 Army Experience Survey (AES). This research product is Volume I of a two-volume set of crosstables describing enlisted retirees from the U.S. Army. Tabulation volumes contain: and introduction to the AES report series; sections overviewing the project and methodology; and a chapter explaining how to read and interpret the tabulations. This text is supplemented by technical appendixes containing an annotated copy of the mail version of the AES instrument (Appendix A); the telephone version of the AES instrument (Appendix B); and coding schemes used to categorize responses to open-ended questions (Appendix C). The other major component of the tabulation volume is comprised of two-way tables of survey variables crossed with five banner variables. Volume I presents tables of selected survey items for enlisted retirees with the following five banner variables: respondent gender, race, AFQT category, time since separating, and term of first enlistment. Volume II contains tables with five different banner variables: respondents' current residence (recruiting brigade), pre-Army education level, marital status at Army separation, military skill groupings, and perceived value of Army experience. Companion volumes are also available for three other separation groups, i.e., first-term separatees, first-term attritees, and mid-career separatees. The complete list of reports is as follows:

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RP 86-04. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Attritees, Volume II.

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RP 86-06. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Mid-Career Separatees, Volume II.

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RP 86-08. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Enlisted Retirees, Volume II.

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RN 86-01. *THE 1985 ARMY EXPERIENCE SURVEY:* Data Source Book and User's Manual.

RP 86-08 The 1985 Army Experience Survey: Tabular Descriptions of Enlisted Retirees, Volume 2, Westat, Inc. January 1986. (AD A175 370) This document is one of a series of ten reports (Technical Report, Research Note, and Research Products) which provide background information on, descriptions of methodology for, and documentation of, the 1985 Army Experience Survey (AES). This research product is Volume II of a two-volume set of cross tables describing enlisted retirees from the U.S. Army. Tabulation volumes contain: an introduction to the AES report series; sections overviewing the project and methodology; and a chapter explaining how to read and interpret the tabulations. This text is supplemented by technical appendixes containing an annotated copy of the mail version of the AES instrument (Appendix A); the telephone version of the AES instrument (Appendix B); and coding schemes used to categorize responses to open-ended questions (Appendix C). The other major component of the tabulation volume is comprised of two-way tables of survey variables crossed with five banner variables. Volume I presents tables of selected survey items for enlisted retirees with the following five banner variables: respondent gender, race, AFQT category, time since separating, and term of first enlistment. Volume II contains tables with five different banner variables: respondents' current residence (recruiting brigade), pre-Army education level, marital status at Army separation, military skill groupings, and perveived value of Army experience. Companion volumes are also available for three other separation groups, i.e., first-term separatees, first-term attritees, and mid-career separatees. The complete list of reports is as follows:

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Research Products

RP 86-09 The 1984 ARI Survey of Army Recruits: Tabular Description of NPS (Active) Army Accessions, Volume 1, Westat, Inc. May 1986. (AD A178 148) The ARI Survey of Army Recruits [more commonly known as the New Recruits Survey (NRS)] is conducted to obtain information on the characteristics, enlistment motivations, attitudes, and knowledge of recruits at the point of their initial entry into the U.S. Army. The eleven reports in the 1984 series include user's manuals, codebooks (which focus on data file documentation, including special variables, and the use of the survey data available from respondents), and tables of survey results. They are:

RN 86-46. *The 1984 ARI Survey of Army Recruits: User's Manual.*

RN 86-47. *The 1984 ARI Survey of Army Recruits: User's Manual for October 84 / February 85 Administration.*

RN 88-42. *The 1984 ARI Survey of Army Recruits: Codebook for Summer 84 Active Army Survey Respondents.*

RN 86-43. *The 1984 ARI Survey of Army Recruits: Codebook for Summer 1984 USAR & ARNG Survey Respondents.*

RN 86-44. *The 1984 ARI Survey of Army Recruits: Codebook for October 84 / February 85 Active Army Survey Respondents.*

RN 86-45. *The 1984 ARI Survey of Army Recruits: Codebook for October 84 / February 85 USAR & ARNG Survey Respondents.*

RP 86-09. *The 1984 ARI Survey of Army Recruits: Tabular Description of NPS (Active) Army Accessions, Volume 1.*

RP 86-10. *The 1984 ARI Survey of Army Recruits: Tabular Description of NPS (Active) Army Accessions, Volume 2.*

RP 86-11. *The 1984 ARI Survey of Army Recruits: Tabular Description of NPS Army National Guard Accessions.*

RP 86-12. *The 1984 ARI Survey of Army Recruits: Tabular Description of NPS Army Reserve Accessions, Volume 1.*

RP 86-13. *The 1984 ARI Survey of Army Recruits: Tabular Description of NPS Army Reserve Accessions, Volume 2.*

A comparison of the methodologies used in the 1984 and 1985 administrations of the NRS, together with recommendations for future surveys, appears in: TR 706. *The 1984 and 1985 ARI Survey of Army Recruits: Methodology and Recommendations for Future Administration.* Reports based on the 1982 and 1983 administrations of the NRS are also available.

RP 86-10 The 1984 ARI Survey of Army Recruits: Tabular Description of NPS (Active) Army Accessions, Volume 2, Westat, Inc. May 1986. (AD A178 149) The ARI Survey of Army Recruits [more commonly known as the New Recruits Survey (NRS)] is conducted to obtain information on the characteristics, enlistment motivations, attitudes, and knowledge of recruits at the point of their initial entry into the U.S. Army. The eleven reports in the 1984 series include user's manuals, codebooks (which focus on data file documentation, including special variables, and the use of the survey data available from respondents), and tables of survey results. They are:

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RP 86-11. *The 1984 ARI Survey of Recruits: Tabular Description of NPS Army National Guard Accessions.*

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RP 86-11 The 1984 ARI Survey of Army Recruits: Tabular Description of Army National Guard Accessions, Westat, Inc. May 1986. (AD A178 211) The ARI Survey of Army Recruits [more commonly known as the New Recruits Survey (NRS)] is conducted to obtain information on the characteristics, enlistment motivations, attitudes, and knowledge of recruits at the point of their initial entry into the U.S. Army. The eleven reports in the 1984 series include user's manuals, codebooks (which focus on data file documentation, including special variables, and the use of the survey data available from respondents), and tables of survey results. They are:

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RP 86-12   The 1984 ARI Survey of Army Recruits: Tabular Descriptions of NPS Army Reserve Accessions, Volume 1, Westat, Inc. May 1986. (AD A178 210) The ARI Survey of Army Recruits [more commonly known as the New Recruits Survey (NRS)] is conducted to obtain information on the characteristics, enlistment motivations, attitudes, and knowl edge of recruits at the point of their initial entry into the U.S. Army. The eleven reports in the 1984 series include user's manuals, codebooks (which focus on data file documentation, including special variables, and the use of the survey data available from respondents), and tables of survey results. They are:

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RP 86-13   The 1984 ARI Survey of Army Recruits: Tabular Description of NPS Army Reserve Accessions, Volume 2, Westat, Inc. May 1986. (AD A178 130) The ARI

Survey of Army Recruits [more commonly known as the New Recruits Survey (NRS)] is conducted to obtain information on the characteristics, enlistment motivations, attitudes, and knowledge of recruits at the point of their initial entry into the U.S. Army. The eleven reports in the 1984 series include user's manuals, codebooks (which focus on data file documentation, including special variables, and the use of the survey data available from respondents), and tables of survey results. They are:

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A comparison of the methodologies used in the 1984 and 1985 administrations of the NRS, together with recommendations for future surveys, appears in:

TR 706. *The 1984 and 1985 ARI Survey of Army Recruits: Methodology and Recommendations for Future Administration.*

Reports based on the 1982 and 1983 administrations of the NRS are also available.

RP 86-14 The 1985 ARI Survey of Army Recruits: Tabular Description of NPS (Active) Army Accessions, Volume 1, Westat, Inc. April 1987. (AD A181 807) This is one of eight reports that provide background information, descriptions of survey approach, assessments of data quality, and preliminary results from the 1985 summer administration of the ARI Survey of Army Recruits, familiarly known as the New Recruit Survey (NRS). This is Volume I of a two-volume set of crosstables describing the attitudes, demographics, and service-related characteristics of non-prior-service Army recruits entering active duty during the summer of 1985. Tabulation volumes contain an introduction to the 1985 NRS report series and project overview; a chapter explaining how to read and interpret the tabulations; a set of two-way tables of NRS itmes crossed with five banner variables; and four technical appendixes including each of the four 1985 NRS instruments. Separate tabulation volumes were produced for each of the three Army components, the Regular Active Army (RA), the Army Reserve (USAR), and Army National Guard (ARNG). Tabulations reflect data gathered during the 1985

summer administration of the NRS. The crossing variables used in each tabulation volume include demographic and service-related characteristics and vary across the different components. Other reports in this series provide more extensive documentation of the background and approach to the summer administration of the 1985 NRS. A combined methodology report compares procedures employed in the 1984 and 1985 survey administrations. Other reports are also available for the 1982, 1983, and 1984 administrations.

RP 86-15 The 1985 ARI Survey of Army Recruits: Tabular Descriptions of NPS (Active) Army Accessions, Volume 2, Westat, Inc. April 1987. (AD A181 805) This is one of eight reports which provide background information, descriptions of survey approach, assessments of data quality, and preliminary results from the 1985 Summer administration of the ARI Survey of Army Recruits, familiarly known as the New Recruit Survey (NRS). This is Volume 2 of a two-volume set of crosstables describing the attitudes, demographics, and service-related characteristics of non-prior service Army recruits entering active duty during the summer of 1985. Tabulation volumes contain: an introduction to the 1985 NRS report series and project overview; a chapter explaining how to read and interpret the tabulations; a set of two-way tables of NRS items crossed with five banner variables; and four technical appendixes including each of the four 1985 NRS instruments. Separate tabulation volumes were produced for each of the three Army components, the Regular Active Army (RA), the Army Reserve (USAR), and Army National Guard (ARNG). Tabulations reflect data gathered during the 1985 Summer administration of the NRS. The crossing variables used in each tabulation volume include demographic and service-related characteristics and vary across the different components. Other reports in this series provide more extensive documentation of the background and approach to the Summer administration of the 1985 NRS. A combined methodology report compares procedures employed in the 1984 and 1985 survey administrations. Other reports are also available for the 1982, 1983, and 1984 administrations.

RP 86-16 The 1985 ARI Survey of Army Recruits: Tabular Description of Army National Guard Accesssions, Westat, Inc. April 1987. (AD A181 803) This is one of eight reports which provide background information, descriptions of survey approach, assessments of data quality, and preliminary results from the 1985 Summer administration of the ARI Survey of Army Recruits, familiarly known as the New Recruit Survey (NRS). This is a volume of crosstables describing the attitudes, demographics, and service-related characteristics of non-prior service Army recruits entering the Army National Guard during the summer of 1985. Tabulation volumes contain: an introduction to the 1985 NRS report series and project overview; a chapter explaining how to read and interpret the tabulations; a set of two-way tables of NRS items crossed with five banner variables; and four technical appendixes including each of the four 1985 NRS instruments. Separate tabulation volumes were produced for each of the three Army components, the Regular Active Army (RA), the Army Reserve (USAR), and Army National Guard (ARNG). Tabulations reflect data gathered during the 1985 Summer administration of the NRS. The crossing variables used in each tabulation volume include demographic and service-related characteristics and vary across the different components. Other reports in this series provide more extensive documentation of the background and approach to the Summer administration of the 1985 NRS. A combined methodology report compares procedures employed in the 1984 and 1985 survey administrations. Other reports are also available for the 1982, 1983, and 1984 administrations.

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RP 86-17 The 1985 ARI Survey of Army Rescruits: Tabular Description of NPS Army Reserve Accessions, Volume 1, Westat, Inc. April 1987. (AD A181 806) This is one of eight reports which provide background information, descriptions of survey approach, assessments of data quality, and preliminary results from the 1985 Summer administration of the ARI Survey of Army Recruits, familiarly known as the New Recruit Survey (NRS). This is Volume 1 of a two-volume set of crosstables describing the attitudes, demographics, and service-related characteristics of non-prior service Army recruits entering Reserve duty during the summer of 1985. Tabulation volumes contain: an introduction to the 1985 NRS report series and project overview; a chapter explaining how to read and interpret the tabulations; a set of two-way tables of NRS items crossed with five banner variables; and four technical appendixes including each of the four 1985 NRS instruments. Separate tabulation volumes were produced for each of the three Army components, the Regular Active Army (RA), the Army Reserve (USAR), and Army National Guard (ARNG). Tabulations reflect data gathered during the 1985 Summer administration of the NRS. The crossing variables used in each tabulation volume include demographic and service-related characteristics and vary across the different components. Other reports in this series provide more extensive documentation of the background and approach to the Summer administration of the 1985 NRS. A combined methodology report compares procedures employed in the 1984 and 1985 survey administrations. Other reports are also available for the 1982, 1983, and 1984 administrations.

RP 86-18 The 1985 ARI Survey of Army Recruits: Tabular Description of NPS Army Reserve Accessions, Volume 2, Westat, Inc. April 1987. (AD A181 807) This is one of eight reports which provide background information, descriptions of survey approach, assessments of data quality, and preliminary results from the 1985 Summer administration of the ARI Survey of Army Recruits, familiarly known as the New Recruit Survey (NRS). This is Volume 2 of a two-volume set of crosstables describing the attitudes, demographics, and service-related characteristics of non-prior service Army recruits entering Reserve duty during the summer of 1985. Tabulation volumes contain an introduction to the 1985 NRS report series and project overview; a chapter explaining how to read and interpret the tabulations; a set of two-way tables of NRS items crossed with five banner variables; and four technical appendixes including each of the four 1985 NRS instruments. Separate tabulation volumes were produced for each of the three Army components, the Regular Active Army (RA), the Army Reserve (USAR), and Army National Guard (ARNG). Tabulations reflect data gathered during the 1985 summer administration of the NRS. The crossing variables used in each tabulation volume include demographic and service-related characteristics and vary across the different components. Other reports in this series provide more extensive documentation of the background and approach to the summer administration of the 1985 NRS. A combined methodology report compares procedures employed in the 1984 and 1985 survey administrations. Other reports are also available for the 1982, 1983, and 1984 administrations.

RP 86-19 Multiple Integrated Laser Engagement System Training Checklist, Fobes, J.L.; Roberts-Gray, C.; Ritenour, T.J. May 1986. (AD A174 398) Tactical engagement simulation training with the Multiple Integrated Laser Engagement System (MILES) provides the most realistic feedback for collective training and is the key to home station preparation for the National Training Center. The many Army documents providing extensive guidance on such training are briefly summarized in this MILES training checklist in a format appropriate

for use in the field. This guide is being published as a graphic training aid (GTA), by Director, Tactical Engagement Simulation, to provide trainers with critical prompts on what to do before, during, and after an exercise to obtain maximal gains from training exercises. '

RP 86-20 Procedure Guides for the Equipment Records and Parts Specialist (MOS 76C), Tremont, P.J.; Connor, M.V.; Franklin, H.J.; Hall, T.; Pepper, J. May 1986. (AD A174 205) This product presents a 15 Procedure Guides describing the sequence of actions required of the Equipment Records and Parts Specialist (MOS 76C). All critical tasks for each of the four duty positions comprising the MOS are covered within the Guides, which are intended to be used in the classroom or field by anyone performing in 76C positions. Supervisors and instructors may also use the Guides as a means of ensuring uniformity of instruction.

RP 86-21 Lessons Learned During 7th Infantry Division's Transition to Light Division Status, Hardy, G.D., Jr. June 1986. (AD B106 866) To meet the requirements for a substantial but relatively inexpensive, quick-reacting force responsive to regional contingencies, the Army has started to transform a number of Infantry Divisions to an especially light, mobile, and rapidly deployable configuration. As the first division to transition, the 7th Infantry Division (7ID) recognized that restructuring would create major organizational changes in elements of the Division and how they work together and might create unpredictable organizational stresses and problems within and between elements. Since divisions were not all converting at once, ARI, acting in concert with the 7th Infantry Division (Light) (7ID(L)) Transition Officer over the period a year, reviewed files, collected written comments and issues, and interviewed division staff and operating elements to identify problems and potential solutions for application to 7ID(L) transition and to develop and document "lessons learned" to aid other divisions in their transitioning to Light status. Issues are presented and discussed as they apply to responsible individuals and offices at command, staff, and operating element levels during both preparation for and execution of the transition.

RP 86-22 Aid to Improved Marksmanship, Schendel, J.D.; Osborne, A.D.; Lucker, H. June 1986. (AD A995-492) Aid to Improved Marksmanship (AIM) provides inexpensive, self-paced, performance based rifle marksmanship training that can be conducted anywhere, even in the absence of supervision. The purpose of AIM is to provide a basic understanding of the correct M16A1 sight picture and the effects of target motion on point of aim. This is accomplished through a series of partial exercises involving the use of a plastic "sight" overlay and scaled "enemy soldier" targets. Feedback is provided on where each "shot" would hit given a particular point of aim.

RP 86-23 Transitional Performance Aid for the Equipment Records and Parts Specialist (MOS 76C), Dressel, J.D.; Tremont, P.J.; Kessler, J.J. June 1986. (AD A174 870) The Transitional Performance Aid (TPA) is designed to guide the action sequences required of the Equipment Records and Parts Specialist (MOS 76C). It consists of 15 flowcharts and accompanying doctrinal references that provide guidance for performing all critical tasks for each of the four duty positions comprising MOS 76C. The TPA is intended for classroom and field use by persons learning to perform 76C operations.

**RP 86-24 Guidelines for Automation: A How-To Manual for Units Receiving Auto-
mated Command and Control Systems,** Lussier, J.W. July 1986. (AD A178 224)
The manual provides information to field unit users who are responsible for introducing
automation into command and control functions. Army efforts to automate the command and
control system are described, and the role of the field units in the effort is outlined. Guidelines
are provided to assist field units in developing garrison and tactical applications. Included are
guidelines for assembling the personnel, organizing the effort, identifying candidate applica-
tions, refining and developing the concept, constructing flow charts of the process, defining the
requirments, and conducting the demonstration and trials. Not included are the technical
areas of programming and software design.

RP 86-25 User Interface Requirements for Battlefield Management Systems (BMS),
Lickteig, C.W. August 1986. (AD A174 811) This research investigated user inter-
face requirements for operating the Battlefield Management System (BMS) and the system's
potential for reducing the small unit leader's workload. BMS, the primary product improve-
ment planned for the M1A1 Block II modification, is an integrated complex of battlefield
information acquisition, processing, and communication technologies. While BMS is expected
to significantly enhance command and control, it may require a substantial change in standard
operating procedures, such as a shift from vocal (FM radio) to nonvocal communication, and
from paper maps to digital map displays. To ensure that user requirements were included in
the design of this innovative system, a prototype interface was developed on an Integrated
Raster Imaging System (IRIS) 1400 computer system. A cross-section of small unit leaders
worked with a digitized terrain data base (Fulda Gap) and menu-structured report functions
to construct and edit the map displays and tactical reports needed for their respective duty
positions. User requrements for display features and control funcctions were obtained,
together with their recommendations for overall configuration, size, and operating charac-
teristics of the BMS interface.

**RP 86-26 A Comparative Functional Analysis of Elevated Sensor System (ESS)
Surveillance Mission Requirements for Two Prototype Battlefield Sys-
tems,** Kraemer, R.R.; Witmer, B.G. August 1986. (AD B107 396) This report presents an
overview of the Battlefield Management System (BMS) concept and BMS I prototype systems
produced in conjunction with the Force Development Test and Experimentation (FDTE)
conducted by the U.S. Army Armor Engineer Board at Fort Knox, Kentucky. More important,
it provides a comparative description and analysis of major functions performed by BMS
operators in accomplishing Elevated Sensor System (ESS) surveillance mission requirements.

**RP 86-27 Defining Roles in the Development of a Computer-Aided ARTEP Produc-
tion System (CAPS),** Meliza, L.L. August 1986. (AD A178 445) Army service
schools use typewriters and/or stand-alone word processors to prepare Army Training and
Evaluation Program (ARTEP) documents as guides to unit collective training. The ARTEP
development workload has greatly increased in recent years; this fact makes it difficult for
schools to prepare/revise documents in a timely fashion. The ARTEP development process
would benefit from the careful application of computer technology. The U.S. Army Training
Board (ATB), the U.S. Army Infantry School (USAIS), the U.S. Army Armor School
(USAARMS), the U.S. Army Intelligence Center and School (USAICS), the Army Training

Support Center-Information Management Office (ATSC-IMO), and the U.S. Army Research Institute (ARI) are involved in developing a Computer-aided ARTEP Production System (CAPS). The CAPS concept calls for the application of a commercially available Relational Database Management System (RDBMS) to ARTEP development. This report provides an updated version of the CAPS design concept, and it defines the roles of CAPS participants in the near-term development of a working CAPS within USAIS.

RP 86-28 Organizational Effectiveness Information System (OEIS) "User's Manual", Perkins, S.R. September 1986. (AD A175 615) This report contains the manual designed to be used with the prototype Organizational Effectiveness Information System (OEIS) (see ARI Research Note 84-131). The manual describes the Design and Implementation System (IDS), the Survey System (SS), and the Resource System (RS). Although the prototype OEIS was not implemented, this manual documents the details of entering and retrieving Organizational Development (OD) case data, constructing survey instruments from an item pool (as well as permitting the user to add extra items), and generating resource directories of persons, printed documents, and events.

RP 86-29 Guide to the Operation of SIMCAT, Drucker, E.H. September 1986. (AD A175 701) This report contains instructions for the operation of SIMCAT, a prototype computer-based battle simulation designed for training command, control, and communications skills required during platoon-level armor operations. These instructions supplement those contained in SIMCAT's supporting documentation.

RP 86-30 Plan for Research on Army Families, Segal, M.W. September 1986. (AD A175 576) This report is a summary of the work of a panel consisting of Mady Wechsler Segal, Gary L. Bowen, Gerald M. Coran, Barbara Pate Glacel, Dennis K. Orthner, and David R. Segal. The panel was convened to assist the Army Research Institute in planning its research on Army families. This report is an overview and synthesis of the panel's writing, deliberations, and conclusions.

RP 86-31 A Self-Correcting Compass Course for Training Dead Reckoning, Lucariello, G.; Greene, W.H.; Moffett, R.; O'Hanlan, J.T. October 1986. (AD A180 125) Dead reckoning involves navigating by distance (pace count) and direction (compass azimuth). The purpose of this paper is to describe a self-correcting compass course designed to train this skill. Additionally, a computer program has been written that can be used to generate the azimuth and distance for each leg of the course, facilitating course set up. The compass course can be easily modified to work in any training area to assist and reinforce training on dead reckoning. Similar courses have been used by the Rangers and Special Forces to increase soldiers' confidence in their navigational abilities. Advantages of the new course include its self-correcting aspect and the fact that the soldier is forced into using an accurate pace count.

RP 86-32 After Action Review (AAR) Guide for Army Training Battle Simulation System (ARTBASS), Kaplan, I.T.; Fallensen, J.J. October 1986. (AD A180 797) The After Action Review (AAR) Guide contains procedures for the preparation and conduct of Army Training Battle Simulation System (ARTBASS) AARs. The guide describes the purpose

of an AAR, the role of the chief controller, and the four stages of an AAR. Examples of effective and ineffective AARs are presented, and the essentials of effective AARs are discussed.

RP 86-33 DINAA: The Dynamic Intelligence Assessment Aid, Probus, M.A.; Donnell, M.L. November 1986. (AD A180 998) The Dynamic Intelligence Assessment Aid (DINAA) is designed to assist military intelligence analysts in revising judgments of an enemy's most likely avenue of approach as new information arrives. When a message is received, the analyst assesses, for each avenue of approach, the likelihood that the reported event would occur if the enemy were actually using that avenue of approach. DINNA then applies Bayes' Theorem to the user's assessments and generates a set of probabilities.

RP 87-01 The De Anza Primer: A Basic Introduction to the De Anza Graphics Display, Nichols, J.J. January 1987. (AD A179 798) The De Anza Primer provides personnel newly assigned to the Training Analysis and Feedback (TAF) Section of the NTC Operations Group with a training tool for learning the routine skills needed to operate the De Anza Graphics Display. The instruction is organized in a step-by-step manner tht begins with the most rudimentary station operations and progresses through the manipulation and control of all functions necessary for routine operation of the De Anza Graphics Display Tablet. Instruction is presented in a series of hands-on exercises that demonstrate various graphics display functions used by Core Instrumentation Subsystem (CIS) personnel to electronically monitor the battalion task force during the rotation. The manual is divided into six sections: (1) Preventive Maintenance/Minor Troubleshooting, (2) Map Control, (3) Unit/Player Display Formats, (4) Control Measures, (5) Map and Button Bins, and (6) Historian and AAR Mode Controls. Each section contains one or more sets of hands-on exercises designed to be completed with minimum supervision regardless of the skill level of the learner. All exercise sets can be completed in 4-1/2 hours. In addition to the Table of Contents, which lists all exercises and function buttons described in the text, an alphabetical Index that lists each De Anza function addressed in the manual and references the page(s) of instruction is also included.

RP 87-02 Observations From Three Years at the National Training Center, Word, L.E. January 1987. (AD A178 386) This report presents the results of a conference at which Colonel Larry Word gave his observations of the National Training Center. Colonel Word had been the Chief Observer/Controller for Mechanized Infantry Battalions for 3 years. He describes NTC operations and factors that help the ensure successful performance. The NTC has recently begun some brigade-level operations and Colonel Word discusses initial lessons learned. National Guard performance, home station training, After Action Reviews, and plans for the future are covered. AD A 179 386

RP 87-03 A Detailed Description of the National Training Center Instrumentation System Initialization Procedure, Ritenour, T.J. January 1987. (AD A180 161) This report presents a detailed description of the Instrumentation System Initialization Procedure that occurs at the start of each National Training Center (NTC) training unit rotation. The NTC Initialization Procedure is the process that links the identifying data elements for each instrumented player. This linkage is necessary both for the operation of the NTC instrumentation system pooling, as well as subsequent analysis of NTC data for research purposes. The description provided in this document of the Initialization Procedure has been

written at a management level. Thus, it will be most useful to NTC personnel with management responsibilities or to members of the research community who require a broad understanding of how NTC data is collected. Readers must, therefore, have a general understanding of the NTC to fully benefit from this report.

RP 87-04 to 87-07 Canceled.

RP 87-08 The 1986 ARI Survey of U.S. Army Recruits: Codebook for Active Army Survey Respondents, Benedict, M.E.; Elig, T.W.; Kopischke, D.W. April 1987. (AD A182 936) This is one of eight reports produced to document the 1986 Army Research Institute Survey of U.S. Army Recruits, also known as the New Recruit Survey (NRS). This volume concentrates on the data file documentation and the use of survey data obtained from Active Army Respondents. A separate volume that documents the survey data files for Active Army Reserve and National Guard respondents is available. A brief project overview is provided, as well as an instructional narrtive pertaining to the codebook-based interpretations and use of the 1986 data. Documentation is provided for the development of special variables from Army personnel records and recoding of survey items. Other reports in this series provide more extensive background documentation of the 1986 New Recruit Survey. Tabular descriptions that present the preliminary results of the 1986 survey separately for each Army component are available.

RP 87-09 The 1986 ARI Survey of U.S. Army Recruits: Codebook for Army Reserve National Guard Survey Respondents, Benedict, M.E.; Elig, T.W.; Kopischke, D.W. April 1987. (AD A182 887) This is one of eight reports produced to document the 1986 Army Research Institute Survey of U.S. Army Recruits, also known as the New Recruit Survey (NRS). This volume concentrates on the data file documentation and the use of survey data obtained from Army Reserve and National Guard Respondents. A separate volume that documents the survey data files for Active Army respondents is available. A brief project overview is provided, as well as an instructional narrative pertaining to the codebook-based interpretations and use of the 1986 data. Documentation is provided for the development of special variables from Army personnel records and recoding of survey items.
Other reports in this series provide more extensive background documentation of the 1986 New Recruit Survey. Tabular descriptions that present the preliminary results of the 1986 survey separately for each Army component are available.

RP 87-10 The 1986 ARI Survey of U.S. Army Recruits: Tabular Description of NPS Army Reserve Accessions, Volume 1, Benedict, M.E.; Elig, T.W.; LaBatte, J.A. April 1987. (AD A182 920) This is one of eight reports produced to document the 1986 Army Research Institute Survey of U.S. Army Recruits, also known as the New Recruit Survey (NRS). This is volume 1 of a two-volume set of crosstables describing the attitudes, demographics, and service-related characteristics of non-prior -service Army Reserve recruits during the summer of 1986. Tabulation volumes contain an introduction to the 1986 NRS reports series and project overview; an explanation of how to read and interpret tabulations; a set of two-way tables of NRS items crossed with five banner variables; and in a technical appendix the survey instrument used in the summer of 1986. Separate tabulation volumes were produced for each of the three Army components: the regular active Army (RA); the U.S. Army Reserve (USAR);

and the Army National Guard (ARNG). Tabulations reflect data gathered during the summer administration of the survey. The crossing variables used in each tabulation volume include demographic and service-related characteristics that vary across components. Other reports in this series provide more extensive documentation of the background and approach to the 1986 NRS administration. Other reports are also available for the 1982, 1983, 1984 (summer and winter), and 1985 survey administrations.

RP 87-11 The 1986 ARI Survey of U.S. Army Recruits: Tabular Description of NPS Army Reserve Accessions, Volume 2, Benedict, M.E.; Elig, T.W.; LaBatte, J.A. April 1987. (AD A182 997) This is one of eight reports produced to document the 1986 Army Research Institute Survey of U.S. Army Recruits, also known as the New Recruit Survey (NRS). This is volume 2 of a two-volume set of crosstables describing the attitudes, demographics, and service-related characteristics of non-prior -service Army Reserve recruits during the summer of 1986. Tabulation volumes contain an introduction to the 1986 NRS reports series and project overview; an explanation of how to read and interpret tabulations; a set of two-way tables of NRS items crossed with five banner variables; and in a technical appendix the survey instrument used in the summer of 1986. Separate tabulation volumes were produced for each of the three Army components: the regular active Army (RA); the U.S. Army Reserve (USAR); and the Army National Guard (ARNG). Tabulations reflect data gathered during the summer administration of the survey. The crossing variables used in each tabulation volume include demographic and service-related characteristics that vary across components. Other reports in this series provide more extensive documentation of the background and approach to the 1986 NRS administration. Other reports are also available for the 1982, 1983, 1984 (summer and winter), and 1985 survey administrations.

RP 87-12 The 1986 ARI Survey of U.S. Army Recruits: Tabular Description of NPS (Active) Accessions, Volume 1, Benedict, M.E.; Elig, T.W.; Labatte, J.A. April 1987. (AD A182 698) This is one of eight reports produced to document the 1986 Army Research Institute Survey of U.S. Army Recruits, also known as the New Recruit Survey (NRS). This is volume 1 of a two-volume set of crosstables describing the attitudes, demographics, and service-related characteristics of non-prior -service Army recruits entering active duty during the summer of 1986. Tabulation volumes contain an introduction to the 1986 NRS reports series and project overview; an explanation of how to read and interpret tabulations; a set of two-way tables of NRS items crossed with five banner variables; and in a technical appendix the survey instrument used in the summer of 1986. Separate tabulation volumes were produced for each of the three Army components: the regular active Army (RA); the U.S. Army Reserve (USAR); and the Army National Guard (ARNG). Tabulations reflect data gathered during the summer administration of the survey. The crossing variables used in each tabulation volume include demographic and service-related characteristics that vary across components. Other reports in this series provide more extensive documentation of the background and approach to the 1986 NRS administration. Other reports are also available for the 1982, 1983, 1984 (summer and winter), and 1985 survey administrations.

RP 87-13 The 1986 ARI Survey of U.S. Army Recruits: Tabular Description of NPS (Active) Army Accessions, Volume 2, Benedict, M.E.; Elig, T.W.; LaBatte, J.A. April 1987. (AD A182 921) This is one of eight reports produced to document the 1986 Army

Research Institute Survey of U.S. Army Recruits, also known as the New Recruit Survey (NRS). This is volume 2 of a two-volume set of crosstables describing the attitudes, demographics, and service-related characteristics of non-prior -service Army recruits entering active duty during the summer of 1986. Tabulation volumes contain an introduction to the 1986 NRS reports series and project overview; an explanation of how to read and interpret tabulations; a set of two-way tables of NRS items crossed with five banner variables; and in a technical appendix the survey instrument used in the summer of 1986. Separate tabulation volumes were produced for each of the three Army components: the regular active Army (RA); the U.S. Army Reserve (USAR); and the Army National Guard (ARNG). Tabulations reflect data gathered during the summer administration of the survey. The crossing variables used in each tabulation volume include demographic and service-related characteristics that vary across components. Other reports in this series provide more extensive documentation of the background and approach to the 1986 NRS administration. Other reports are also available for the 1982, 1983, 1984 (summer and winter), and 1985 survey administrations.

RP 87-14   The 1986 ARI Survey of U.S. Army Recruits: Tabular Description of NPS National Guard Accessions, Benedict, M.E.; Elig, T.W.; LaBatte, J.A. April 1987. (AD A182 697) This is one of eight reports produced to document the 1986 Army Research Institute Survey of U.S. Army Recruits, also known as the New Recruit Survey (NRS). This is a volume of crosstables describing the attitudes, demographics, and service-related characteristics of non-prior-service National Guard recruits entering during the summer of 1986. This tabulation volume contains an introduction to the 1986 NRS reports series and project overview; an explanation of how to read and interpret tabulations; a set of two-way tables of NRS items crossed with five banner variables; and a technical appendix of the Army National Guard survey instrument used in the summer of 1986. Separation tabulation volumes were produced for each of the three Army components: the regular active Army (RA); the U.S. Army Reserve (USAR); and the Army National Guard (ARNG). Tabulations reflect data gathered during the summer administration of the survey. The crossing variables used in each tabulation volume include demographic and service-related characteristics that vary across components. Other reports in this series provide more extensive documentation of the background and approach to the 1986 NRS administration. Other reports are also available for the 1982, 1983, 1984 (summer and winter), and 1985 survey administrations.

RP 87-15   Artificial Intelligence/Enemy Courses of Action (AI/ENCOA): User's Manual, Luster, P.; McIntyre, J.R.; Adelman, L.; Lehner, P.E.; Donnell, M. April 1987. (AD A182 079) AI/ENCOA (Artificial Intelligence/Enemy Courses of Action) is a prototype decision aid designed to assist Army tactical intelligence analysts in evaluating alternative enemy courses of action. AI/ENCOA combines the use of additive multiattribute utility (MAU) models for courses of action (scores and weights) to the MAU model. AI/ENCOA is composed of two parts: a generic software package that implements a combined AI/MAU architecture and two COA "rule bases" for evaluating different types of possible enemy courses of action. This report is a user's guide that contains an overview of the aid, a detailed demonstration of its operation, an explanation of the menu options, and reference material consisting of the background scenario for the demonstration and rationale for score assignment in the underlying model.

RP 87-16 Terrain and Contour Model Instruction, Lucariello, G. April 1987. (AD A182
114) Terrain association is the ability to interpret map information (e.g., contour
lines) to the real world and to see the real world and be able to identify it on a map. The purpose
of this report is to teach soldiers the relationship between the map and terrain. The produce
consists of a 1/:50,000 scale map sheet, contour model, terrain model, and the instructional
material. The terrain model instruction is a transportable and low-cost training aid that can
be used for reserve component, unit, instructional and school training.

A DA 182 274

**RP 87-17 Exit Survey of First-Term Enlisted Analyzed for Gender, Type of Separa-
tion, MOS Traditionality, and MOS Physical Demands**, Nogami, G.Y.; Varty,
J.F.; Ross, R.M; Gade, P.A. April 1987. (AD A182 139) Between September and December 1983,
3,938 first-term enlisted soldiers properly completed an exit survey as they separated from the
Army. This report presents the data from the entire survey on demographic characteristics,
economic concerns and attitudes. The crosstabulations are in four sets: (1) gender, (2) separa-
tion categories (attrition categories and ETS), (3) MOS traditionality, and (4) MOS physical
demands categories (MEPSCAT).

**RP 87-18 Training Requirements for the Battlefield Management System (BMS): A
Preliminary Analysis**, Lickteig, C.W. May 1987. (AD A185 468) This product
provides a preliminary identification of the training requirements for the Battlefield Manage-
ment System (BMS). BMS is an integrated complex of technologies for the acquisition,
processing, storage, and transmission of battlefield information, and is expected to partially
automate the command, control, and communication (c3) of lower echelon, battalion down,
Armor units. For this analysis three cumulatively automated generations of BMS were
projected, beginning with an intervehicular information system (IVIS) in the near term, a
midterm upgrade referred to as BMS, and a far term, objective system enhanced by artificial
intelligence (AI), BMS/AI. Training requirements unique to the functional capabilities of each
of these systems were based on a subjective analysis of the current task requirements
associated with the platoon leader position. Primary objectives of the analysis were to identify
the range and nature of changes in platoon leader task performance anticipated for each of
these three automated C3 systems. Additional training requirements, such as training device
configuration, training media, training site, and personnel selection and training assignment,
were also addressed.

**RP 87-19 Preliminary Training Requirements Analysis for the Commander's Inde-
pendent Thermal Viewer**, by Quinkert, K.A. May 1987. (AD A185 467) This
product provides a preliminary analysis of the training requirements for the Commander's
Independent Thermal Viewer (CITV). CITV is a real time thermal sensing system designed
for tank commander (TC) use in both open and closed hatch for target acquisition and
surveillance. It has been proposed as an integral component of the M1A1 fire control system
and will provide a backup capability for firing the main gun. For this analysis two configura-
tions of the CITV are included. The first considers the CITV in relation to the already existing
system to include the Gunner's Primary Sight Extension (GPSE). The second assumes the
GPSE is removed and only the CITV exists. This analysis identifies the necessary changes in
the duties of the TC as a result of the addition of a CITV. These changes are then incorporated
into a conduct-of-fire procedure and subjectively analyzed for potential problems related to TC

training. Additionally they provide information about the location, cause and tentative solutions for the potential training problems.

RP 87-20 Training Support Package for Moving Target Engagement With Existing Ranges and Devices, Martere, R.F.; Parish, J.R.; Hunt, J.P. May 1987. (AD A189 370) This research product presents a program of instruction for the engagement of infantry-type moving targets for Infantry One Station Unit Training (OSUT) soldiers. It was designed for use by the U.S. Army Infantry Training Center (ATC) Advanced Rifle Marksmanship (ARM) committee and cadre personnel. Instruction is situationally focused. It is oriented for application on existing ranges and facilities at Fort Benning, Georgia. Additional ammunition resources are required for its implementation. Detailed lesson outlines and hard copy vugraphs are included.

RP 87-21 The Leader Requirements Survey Package, Steinberg, A.G. July 1987. (AD A190 582) The Leader Requirements Survey Package contains the Leader Requirements Survey (Forms A and B) and the answer booklets. This task analysis survey of the leadership portion of the job was developed by the Army Research Institute in order to provide the Army with empirical information about the progressive and sequential nature of Army leadership. The survey task list was based on interviews with more than 200 commissioned officers (2LT - COL) and noncommissioned officers (SGT - CSM) and was distributed to these same groups Army-wide, across all branches. The results of this survey (to be published in a forthcoming report) will be used to ensure that the Army's multilevel leadership training program is commensurate with leader requirements.

RP 87-22 Development of Core Data Set of the Officer Longitudinal Research Data Base, Younkman, D.D. July 1987. (AD A191 338) The U.S. Army Research Institute has developed an Officer Longitudinal Research Data Base (OLRDB) to support a variety of research objectives. The Core Data Set was developed to provide an accurate list of former and current active-duty Army officers. Historical data were collected from the Officer Master Files for 1979 to 1986, the Separated Officer Master Files for 1979 to 1986, and the Defense Manpower Data Center Master Data and Loss File (loss records only) for 1970 to 1978. The usefulness of the resulting data set was demonstrated with an exploratory analysis of the retention of junior officers over an 8-year span.

RP 87-23 Combat Leaders' Guide: Rifle Platoon and Squad, Winn, R.B.; Evensen, E.B.; Salter, M.S. July 1987. (AD A190 605) The modern combat leader must make many complex decisions under conditions of great stress. However, while the leader's job has increased in level of difficulty, there are no effective, standardized job performance aids to assist the leader in accomplishing his job. The Combat Leaders' Guide project was initiated to produce a modular job performance aid system for combat leaders to use during periods of high stress in continuous combat. The Combat Leaders' Guide is designed to (1) be fully usable under combat conditions; (2) have a standardized format; (3) be a modular, highly flexible system; (4) provide fast information retrieval, (5) be easily personalized to individual need, job assignment, mission requirements, equipment availability, and area of operations by adding or removing modules; (6) be easily supplemented by higher commanders; (7) be fully usable under conditions of adverse weather and low light; and (8) utilize as many government

standard components as possible. The Combat Leaders' Guide, of which this is the original edition, will have as compelmentary material an authoring guide, a final report detailing the history of the project and user reaction to the Guide, and an updated version, the *Combat Leaders' Guide: Platoon Leader, Platoon Sergeant, and Squad Leader*.

RP 87-24 Development of ROTC Data Sets and Evaluation of Their Usefulness for Officer Longitudinal Research Data Base, Younkman, D.D. August 1987. (AD A189 692) The U.S. Army Research Institute has developed an Officer Longitudinal Research Data Base (OLRDB) to support a variety of research objectives. The ROTC advanced camp and commissioning files for 1982 through 1985 were organized and matched to the OLRDB core data set. The resulting data sets are used to evaluate the usefulness of ROTC historical data and the ORLDB for estimating the relationship between scholarships and retention. This relationship was found to be useful; however, additional years of OLRDB data would provide a better base for analysis.

RP 87-25 U.S. Army Research Institute Officer Logitudinal Research Data Base (OLRDB) User's Manual, Hunter, F.T.; Rachford, D.L.; Kelly, D.R.; Duncan, D. October 1987. (AD A190 588) The U.S. Army Research Institute (ARI) Officer Longitudinal Research Data Base (OLRDB) supports systematic research on officer training, professional development, and utilization. The data base will be updated regularly to enable research on the current Army officer population, as well as analyses requiring historical tracking of information. The online OLRDB data and Data Dictionary were developed to facilitate access to the OLRDB data and to allow for an efficienty updating of the Data Dictionary. This "hard copy" of the manual serves as a general introduction to the data base. It contains the same material as the online manual, less the data dictionary. It is intended to help researchers, especially those without ready access to the ARI computer, to assess the potential usefulness of the OLRDB for their research.

RP 87-26 Canceled.

RP 87-27 Training Technology Transfer Process and Guidelines, Baker, J.D.; Knerr, B.W.; Hart, F.L.; Seidel, R.J. October 1987. (AD A190 901) This report presents a set of guidelines for implementing a new training technology in an Army school environment. In an effort to improve the technology transfer process, the Army has established Training Technology Field Activities (TTFAs), a partnership among the Army Research Institute (ARI), the Army's Training and Doctrine Command (TRADOC), and Army Service Schools to facilitate training technology transfer. The guidelines present the activities necessary for successful training technology transfer using the TTFA team as the vehicle for implementation. The guidelines divide the transfer process into five phases. Each phase is further divided into three stages, with a decision point at the end of each stage. Within each stage is a set of activities that lead to the decision point. For each activity, a set of roles and responsibilities are identified and the major organizations involved in the transfer process are assigned these roles and responsibilities.

RP 87-28 Platoon Leadership Exercises for SIMCAT, Lampton, D.R.; Koger, M.E. October 1987. (AD A191 628) This product contains armor exercises to support

training and training research with SIMCAT (Simulation in Combined Arms Training). SIMCAT is a computer-driven battle simulation that symbolically represents the combat factors needed to practice the command, control, and communication (C3) aspects of armor missions. SIMCAT allows four participants to serve as the platoon leader, the platoon sergeant, and the two tank commanders of a tank platoon. The gunner, loader, and driver positions are simulated by controllers and the computer system. SIMCAT allows soldiers to practice C3 skills and real-time decision making without requiring the presence of full crews and the operation of tanks. Many SIMCAT exercises can be conducted in the time needed to prepare and conduct a single field exercise. SIMCAT is not a substitute for field training, but rather provides safe and efficient pre-field training of basic C3 skills so that resource-intensive field training can be used to advantage. The exercises are based on the Field Training Exercises described in the ARTEP Mission Training Plan and require the participants to exercise Division 86 SOP and basic C3 principles. The exercises are tailored to the terrain data base and the representational and control capabilities and limitations of SIMCAT. Eight exercises are presented. Four are tactical road marches, two are offensive missions, and two are defensive missions. For each, lesson plans, operation orders, mission control graphics, controller scripts, and evaluation checklists are included. Also included are SIMCAT operation instructions and guides for the chief controller, opposing forces controller, and the four tank station controllers needed to conduct SIMCAT exercises.

The exercises are suitable for use with Basic Noncommissioned Officer Course, Advanced Noncommissioned Officer Course, Armor Officer Basic Course, and Armor Officer Advanced Course students, and could be used to support TO&E platoon sustainment and professional training for armor leaders. These exercises also provide a base for using SIMCAT to investigate training issues for current and future battlefield conditions. Much of the material in this report will support initial research with PLBS (Platoon Level Battle Simulation), an enhanced version of SIMCAT, which is now being developed.

RP 87-29 Training Support Package for Advanced Rifle Marksmanship, Martere, R.F.; Hunt, J.P.; Lucariello, G.; Parish, J.R. October 1987. (AD A191 868) This research product presents a program of instruction (POI) for soldiers undergoing One Station Unit Training (OSUT) at the United States Army Infantry Center (USAIC). It is designed to replace the current Advanced Rifle Marksmanship program being taught at the Infantry Training Center (ITC). Instruction is situationally focused and oriented for application on Fort Benning, GA, range facilities only, in conjunction with available special training devices. Utilization of the lesson outlines, special training devices, and other resource allocations described in the recommended training program will result in a higher level of proficiency in all infantry rifle marksmanship skills upon graduation from OSUT. Instructor requirements remain unchanged; however, nominal increases in training time and ammunition requirements are necessary. An Assault Course Range is required. Detailed lesson outlines and necessary training aid samples are included.

RP 87-30 Simulating the Army AH-1S Aviator Qualification Course: Resource Allocation Model, Sprunger, C.A.W.; Tremont, P.J. October 1987. (AD B 121 262) A discrete event model for simulating varying course configurations and conditions was built for the AH-IS Aviator Qualification Course (AQC) to improve resource allocation during the design phase of Army courses. The model consists of a network representing all AQC activities. Within

this network each discrete course event was assigned an event name, a duration (with mean and standard deviation), and a probability of occurrence. The model was validated by initializing it to simulate known conditions, then comparing its output with output obtained under the same conditions in six AH-IS AQC classes over a 5-month period. For each experimental simulation, the model was configured to reflect the course Program of Instruction (POI) of interest and initialized to represent resouce allocation decisions in accordance with the specific purposes of the simulation. Results showed that training system simulations such as these offer a time-saving method of examining the effects of various resource allocation decisions during course design and offer potential for use during course delivery. An additional component to this model, which will be used to predict the effects of resource allocation decisions on skill acquisition, is planned.

RP 87-31 Guidelines for Designing Courseware for the Computerized Hand-Held Instructional Prototype (CHIP), Oxford, R.L.; Holland, V.M.; Goble, L.N. December 1987. (AD A192 344) This research presents guidelines for designing courseware for CHIP (Computerized Hand-held Instructional Prototype), an electronic training aid developed by the Army Research Institute. First, using the framework of instructional systems development, a method of selecting appropriate training content for CHIP is described. Next, a procedure is given for screening and planning a particular CHIP curriculu. Finally, an authoring tool that enables conversion of the curriculum to CHIP format is reviewed, and other resources required for the conversion are discussed. Throughout the discussion, examples and lessons are drawn from five CHIP applications by the Army, Navy, and Air Force, which have undergone the process of selecting, planning, and converting curriculums to CHIP.

RP 87-32 Modern MANPRINT Instrumentation, Duchein, D.; Scott, J.F. November 1987. (AD A192 778) Soldier performance is now recognized as a vital component of weapon system effectiveness, and Army Regulation 602-2 requires measurement of soldier performance of critical operations and maintenance tasks. However, the presence of much of the instrumentation traditionally used to record such performance tends to be obvious and may in fact intrude on the simulated tactical play of most operational tests. This document presents the results of a recent survey of electronic instrumentation which is suitable for detecting and measuring soldier performance, but which is also either not noticeable by test participants or which is at least unobtrusive enough not to distract soldiers from full participation in the tactical situation of the test. Some of this instrumentation has already been used successfully on military systems, and that listed here has been selected from vendors' responses based on the criteria of unobtrusiveness, low cost, and reliability. The four appendixes to the report contain instrumentation listings with summary technical specifications, American vendor sources, and authors' comments.

RP 87-33 Combat Leaders' Guide: Platoon Leaders, Platoon Sergeants, and Squad Leaders, Winn, R.B.; Evensen, E.B.; Salter, M.S. November 1987. (AD A192 049) Since the modern combat leader is faced with making many complex decisions under conditions of great stress and fatigue, it is vital that he be provided with standardized job aids to assist him in accomplishing his combat mission. Until the present report, no effective, standardized job aids have been available to the combat leader. The Combat Leaders' Guide (CLG) project was initiated to produce a modular job performance aid system for combat leaders' use during

periods of high stress in continuous combat. The CLG is designed to (1) be fully usable under combat conditions; (2) have a standardized format; (3) be a modular, highly flexible system; (4) provide fast information retrieval; (5) be easily personalized to individual need, job assignment, mission requirements, equipment availability, and area of operations by adding or removing modules; (6) be easily supplemented by higher command; (7) be fully usable under adverse weather and low light conditions; and (8) utilize as many government standard components as possible. The CLG was designed to be produced in modular format on waterproof and tear-resistant paper. It is fastened with post screws to allow easy addition or deletion of materiel. The present research product represents camera-ready copies of the front and back side of each page. The prototype CLG and an accompanying feedback form were distributed to active Army noncommissioned officers and officers in units and schools, and for desktop review to a number of former service members. Over 40% of respondents returned their feedback forms, with responses overwhelmingly in favor of the CLG's overall effectiveness and utility. Based upon the feedback received, changes were made to the prototype CLG. The changes and the techniques used in the development of both the prototype CLG and the present research product are documented in the research report accompanying the prototype CLG, *Field Evaluation of a Job Aid System for Combat Leaders: Rifle Platoon and Squad*, and in the authoring guide, *Authoring Guide: A Job Aid to Design and Produce a Combat Leaders' Guide*, which is a job aid for the developers of similar job performance aids. The *Combat Leaders' Guide: Platoon Leaders, Platoon Sergeants, and Squad Leaders* represents a fully usable job aid for the modern combat leader. It is easily adaptable to any career military field or branch or service and is equally usable by the Active Army, Army Reserve, and the Army National Guard.

RP 87-34 Projections of the Male Youth Population and Enlistment Propensity by Army Recruiting Battalion: 1980-1995, Verdugo, N.; Nord, R.D. October 1987. (AD A192 325) This report provides estimates and projections of the number of 17- to 21-year-old males by race and Hispanic ethnicity in each Army recruiting battalion for the years 1980-1995. Additional estimates are provided by test score category (TSC) on the Armed Forces Qualification Test (AFQT), high school graduation status, and propensity to enlist in the Army specifically, and a more general propensity to enlist in any service. Population estimates and projections are also provided for Hispanic males aged 17 to 21 in each of 10 states. (The selected states are those with the largest Hispanic populations). Findings include evidence of significant population declines in this age group, particularly during the 1980-1985 period. Hardest hit by population declines are the 1st (Northeast) and 4th (Midwest) recruiting brigades. While the overall youth population is declining, the Hispanic population is increasing in both size and proportion. An obstacle to recruiting more Hispanics, however, is that they are less likely to graduate from high school than either whites or blacks. With respect to Insular Puerto Ricans, the inability to speak English prevents many from passing the AFQT.

RP 87-35 An Instructor's Guide for Implementing Cooperative Learning in the Equipment Records and Parts Specialist Course, Brooks, J.E. December 1987. (AD A191 660) Cooperative learning is a new approach that is being implemented at the U.S. Army Quartermaster School for training Equipment Records and Parts Specialists (MOS 76C). This report describes the background, development, and application of an Instructor's Guide tht was developed by the Army Research Institute (ARI) to familiarize course instructors

with the specific procedures used in implementing the technique. The guide itself is included in an appendix. The guide is divided into sections that are appropriate to the particular information needs of the three different instructor teams that teach the 76C course. It also contains general background information about the cooperative learning technique and the reasons for its implementation. Although the main purpose of the guide is to provide instructors with essential information, it may also be used as a model for devloping similar guides for use in other courses that adopt the cooperative learning approach.

RP 87-36 Canceled.

RP 87-37 Sales Training for Army Recruiter Success: Interviews With Excellent Recruiters, Frieman, S.R. November 1987. (AD A192 326) This report describes a program of research on communication strategies and skills used by excellent Army recruiters. Information to be used for the generation of more effective sales training programs for recruiters was obtained. A linguistic modeling procedure was developed and used to identify communications strategies and skills. Recruiters were interviewed and observed in their field environment. Transcripts of the interviews were analyzed for communication patterns, as well as the belief and rule components of communication strategies. This report is one in a series of four on "Sales Training for Army Recruiter Success". The four reports are identified as follows:
1. Technical Report 779, *Sales Training for Army Recruiter Success: Sales Strategies and Skills Used by Excellent U.S. Army Recruiters.*
2. Research Product 87-37, *Sales Training for Army Recruiter Success: Interviews with Excellent Recruiters.*
3. Research Product 87-38, *Sales Training for Army Recruiter Success: Modeling the Sales Strategies and Skills of Excellent Recruiters.*
4. Technical Report 780, *Sales Training for Army Recruiter Success: Supplementary Information on Modeling the Sales Strategies and Skills of Excellent Recruiters.*

RP 87-38 Sales Training for Army Recruiter Success: Modeling the Sales Strategies and Skills of Excellent Recruiters, Frieman, S.R. November 1987. (AD A191 691) This report describes a program of research on the communication strategies and skills used by excellent Army recruiters. Information to be used to generate more effective sales training programs for recruiters was obtained. A linguistic modeling procedure was developed and used to identify these communications strategies and skills. Transcripts of interviews of recruiters in the field, as well as observations, were analyzed for communication patterns and the belief and rule components of communication strategies. This report is one in a series of four reports on "Sales Training for Army Recruiter Success". The four reports are identified as follows:
1. Technical Report 779, *Sales Training for Army Recruiter Success: Sales Strategies and Skills Used by Excellent U.S. Army Recruiters.*
2. Research Product 87-37, *Sales Training for Army Recruiter Success: Interviews with Excellent Recruiters.*
3. Research Product 87-38, *Sales Training for Army Recruiter Success: Modeling the Sales Strategies and Skills of Excellent Recruiters.*

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4. Technical Report 780, *Sales Training for Army Recruiter Success: Supplementary Information on Modeling the Sales Strategies and Skills of Excellent Recruiters.*

RP 88-01 Training Support Package for Moving Target Engagement With Existing Ranges and Special Devices, Martere, R.F.; Parish, J.R.; Hunt, J.P. January 1988. (AD A192 226) This report presents a program of instruction for the engagement of moving personnel targets with the service rifle. It was designed for use by the Army Training Center (ATC) to teach Infantry One Station Unit Training (OSUT) soldiers. Instruction is situationally focused. It is oriented for application on existing ranges and facilities at Fort Benning, Georgia, in conjunction with available special training devices. Utilization of the devices described and discussed within the recommended training program will cost effectively increase targets hit on the Defense Test Range (DTR). Instructor requirements remain unchanged, but nominal increases in training time and ammunition requirements are necessary. Detailed lesson outlines and hard copy vu-graphs are included.

RP 88-02 Training and Lessons Learned Data Requirements From the National Training Center, Johnson, C.A.; Shadell, M.J. April 1988. (AD A194 327) Specific data requirements for training and lessons learned that would improve the utility of data from the National Training Center are identified. These requirements will be integrated with requirements from Combat Development agencies for the planned system upgrade. Additional technological requirements are also identified.

RP 88-03 Requirements for a Device-Based Training and Testing Program for M1 Gunnery: Volume 2. Detailed Analyses and Results, Morrison, J.E.; Hoffman, R.G. March 1988. (AD A196 365) The first volume of this report (ARI Technical Report 783) presented the analytic rationale for determining the requirements of a device-based program for training and testing armor skills. The resulting concept indicated that it was feasible to use existing devices to train and test much of the domain of tank gunnery in an integrated fashion. However, there were gaps in the program where devices did not support substantial portions of the domain. Also, there were cases where training on basic skills and knowledges was not integrated into training on higher level skills. It was concluded that on-tank experience at both the beginning and advanced stages of training is necessary to train and test the entire domain of gunnery. This second volume of the report details the results that support the research activities described above. These detailed results are presented as a series of appendixes that support the following research activities: (a) definition of the domain of gunnery in terms of individual conditions and actions; (b) identification of gunnery performance deficiencies through an analysis of Directorate of Evaluation and Standardization (DOES) performance data, a review of the research literature, and an analysis of Table VIII performance at Grafenwohr; (c) identification of training and testing objectives through a hierarchical analysis of the gunnery domain; (d) evaluation of gunnery devices with respect to their fidelity features, instructional features, and testing features; and (e) specification of the training and testing program by a detailed listing of objectives within instructional units.

RP 88-04 The Army Communications Objective Measurement System (ACOMS): Quarterly Reports, Gaertner, G.H. (ed.); Nieva, V.F. (ed.); Elig, T.W. (ed.); Benedict, M.E. (ed.). September 1988. (AD A203 906) This Army Communications Objectives

Measurement System (ACOMS) document contains the quarterly reports for Fall 1986, Winter 1987, Spring 1987, Summer 1987, and Fall 1987. Introductory material describes the ACOMS project and explains how to interpret the quarterly reports. Each report contains a brief overview of the quarter's data collection efforts and presents the major results of youth interviews conducted during the quarter. The findings are presented in a series of data tables accompanied by summary text and are further interpreted in the overview chapter. Tables presenting significant quarter-to-quarter changes and the signs (+ or -) of changes that are not statistically significant are also provided in the last four quarterly reports. Discussion of these tables is also included in the summary text.

The ACOMS survey is a multiyear telephone survey of a nationally representative sample of 16- to 24-year-old American youth and their parents. The survey tracked changes in perceptions, attitudes, and behaviors relevant to Army advertising. Data were collected throughout the year, using computer-assisted telephone interviewing (CATI) technology. A modified Waksberg method of random digit dialing (RDD) was used to identify eligible respondents. During the 30-minute interview, youth were also asked about Army advertising, media habits, career plans, and various demographic characteristics. A parent of selected 16- to 20-year-old respondents who met certain eligibility requirements was also interviewed on parallel topics.

Other related reports are identified as follows:

Technical Reports (TR) 784, 785, 786, and 787

Research Report (RR) 1473

Research Products (RP) 88-05, 88-06, 88-07, and 88-08

Research Notes (RN) 88-17, and 88-18

RP 88-05   The 1986/87 Army Communications Objectives Measurement System: Supplementary Tabulations of Enlisted Markets, Rhoads, M.D.; Elig, T.W.; McEntire, R.L.; Hoke, E. July 1988. (AD A199 442) This paper presents supplementary tabulations of youth respondents in the enlisted recruiting markets. Interviews reported in this paper were conducted from October 1986 through June 1987. Samples were drawn monthly by random digit dialing procedures and were weighted to the eligible U.S. population on a quarterly basis. Household screenings to identify eligible respondents were completed in 83.4% of sampled households. Interviews were then completed in 76.3% of eligible youth identified in the completed screenings. The combined response rate was 63.6%, yielding a total of 6,774 youth interviews.

The Army Communications Objectives Measurement System (ACOMS) is a multiyear telephone survey of a nationally representative sample of 16- to 24-year-old American youth and their parents. The survey tracks changes in perceptions, attitudes, and behaviors relevant to Army advertising. Data are being collected continuously through the year, using computer-assisted-telephone-interviewing (CATI) technology. Random digit dialing (RDD), involving a modified Waksberg method, is being used to identify eligible respondents. The 30-minute interview asks youth about their responses to Army advertising, media habits, career plans, and various demographic characteristics. Parents of selected 16-to 20-year-old respondents who meet certain eligibility requirements are also being interviewed on parallel topics.

Other related reports are identified as follows:

Technical Reports (TR) 784, 785, 786, and 787

Research Report (RR) 1473

Research Products (RP) 88-04, 88-06, 88-07, and 88-08.

Research Products

RP 88-06 The 1986/87 Army Communications Objectives Measurement System: Supplementary Tabulations of Officer Markets, Rhoads, M.D.; McEntire, R.L.; Hoke, E.; Elig, T.W. July 1988. (AD A199 753) This report presents supplementary tabulations of youth respondents in the officer recruiting markets. Interviews were conducted from October 1986 through June 1987. Samples were drawn monthly by random digit dialing (RDD) procedures and were weighted to the eligible U.S. population on a quarterly basis. Household screenings to identify eligible respondents were completed in 83.4% of sampled households. Interviews were then completed for 76.3% of eligible youth identified in the completed screenings. The combined response rate was 63.3%, yielding a total of 6,774 youth interviews. The Army Communications Objectives Measurement System (ACOMS) was a multiyear telephone survey of a nationally representative sample of 16- to 24-year-old American youth and their parents. The survey tracked changes in perceptions, attitudes, and behaviors relevant to Army advertising. Data was collected continuously through the year, using computer-assisted-telephone -interviewing (CATI) technology. Random digit dialing (RDD), involving a modified Waksberg method, was used to identify eleigible respondents. The 30-minute interview asked youth about their responses to Army advertising, media habits, career plans, and various demographic characteristics. Parents of selected 16-to 20-year-old respondents who met certain eligibility requirements were also interviewed on parallel topics.

RP 88-07 The Army Communications Objectives Measurement System (ACOMS): Parental Users' Manual, Westat, Inc. July 1988. (AD A199 663) This report documents the Army Communications Objectives Measurement System (ACOMS) parental survey datta files; it contains instructions for the use of the documentation, the ACOMS Cumulative Change Form, the ACOMS Annotated Questionnaire that documents the survey questionnaire items, variable names listed both alphabetically and by order number, and the ACOMS Codebook, which documents the contents of the data files. The ACOMS parental interviews are linked to a telephone survey of a nationally representative sample of 16- to 20-year-old American youth in the Army's primary recruiting markets. The survey tracked changes in perceptions, attitudes, and behaviors relevant to Army advertising. Data were collected continuously through the year, using computer-assisted-telephone-interviewing (CATI) technology. Random digit dialing (RDD), involving a modified Waksberg method, was used to identify eligible respondents. The 20-minute interview asked parents about their responses to Army advertising, media habits, and various demographic characteristics.

RP 88-08 The Army Communicative Objective Measurement System (ACOMS): User's Manual, Westat, Inc. July 1988. (AD A199 840) This report documents the Army Communications Objective Measurement System (ACOMS) survey data files. It contains instructions for the use of the documentation: the ACOMS Cumulative Change Form; the ACOMS Annotated Questionnaire, which documents the survey questionnaire items and corresponding variables; variable names listed both alphabetically and by order number; and the ACOMS Codebook, which documents the contents of the data files. The ACOMS survey is a telephone survey of a nationally representative sample of 16- to 24-year-old American youth and their parents. The survey tracked changes in perceptions, attitudes, and behaviors relevant to Army advertising. Data were collected continuously through the year, using computer-assisted -telephone-interviewing (CATI) technology. Random digit dialing (RDD), involving a modified Waksberg method, was used to identify eligible respondents. The 30-

minute interview asked youth about their responses to Army advertising, media habits, career plans, and various demographic characteristics. A parent of selected 16-to20-year-old respondents who met certain eligibility requirements was also interviewed on parallel topics. Other related reports are identified as follows:

Technical Reports 784, 785, 786, and 787

Research Report 1473

Research Products 88-04, 88-05, 88-06, and 88-07

Research Notes 88-17 and 88-18

RP 88-09 The 1986 ARI Survey of U.S. Army Recruits: Media Habits, Benedict, M.E. April 1988. (AD A193 565) This is one of a series of reports produced from the 1986 Army Research Institute Survey of U.S. Army Recruits. This report contains the tabular analyses of all previously unreported media-related survey items asked of respondents during the summer of 1986. Five appendixes report the tabulations for Active Army, U.S. Army Reserve, and Army National Guard respondents. Other reports in this series include tabular descriptions of non-media -related questions asked of the 1986 survey respondents.

RP 88-10 Canceled.

RP 88-11 User's Manual: Distributed Training Technology Selection Advisor (TECH-SELECT), Hagman, J.D.; Dykstra, D.I., Jr. April 1988. (AD A197 083) This manual guides you through the use of a two-part computer program called TECHSELECT, designed to help with the selection of appropriate technology for distributed training. Part A will help you choose a suitable delivery method for training while Part B will help you identify the equipment configuration required for your particular application. Although TECHSELECT was developed to address the distributed training requirements of the U.S. Army National Guard and Reserve, its fundamental recommendations apply generally to any situation where trainees or students are geographically distributed and cannot meet conventionally at the same place for training. These recommendations will therefore help military, as well as other, training program managers decide the technology that best satisfies their specific needs.

RP 88-12 Implementing Embedded Training (ET): Volume 1 of 10: Overview, Finley, D.L.; Alderman, I.N.; Peckham, D.S.; Strasel, H.C. April 1988. (AD A201 401) This report is an overview of nine volumes of guidelines and procedures on how to do embedded training (ET) in the Army. The contents of these volumes, their relationships to system acquisition models, the users per volume, and the products to which they contribute are briefly described. The document also contains discussions of what constitutes ET; the benefits and capabilities it can provide; some advice on the circumstances to create and the circumstances to avoid to increase the likelihood of a successful ET development; and descriptions of additional resources with points of contact for obtaining them. The additional resources include a video tape, an electronic bulletin board, and considerable documentation.

RP 88-13 Implementing Embedded Training (ET): Volume 3 of 10: The Role of ET in the Training System Concept, Roth, J.T. April 1988. (AD A201 427) This product provides a step-by-step procedure for developing a training system concept very early in the materiel acquisition process. This training system concept outlines appropriate roles for

Embedded Training and Stand-alone Training Devices in supporting hands-on training for a materiel system, with respect to nine specific training needs or situations.

RP 88-14 Authoring Guide: A Job Aid To Design and Produce a Combat Leaders Guide, Winn, R.B.; Evensen, E.B. July 1988. (AD A198 873) The modern combat leader must make many complex decisions under conditions of great stress. However, while the leader's job has increased in difficulty, there are no effective, standardized job performance aids available to help the combat leader accomplish his job. This report is part of Combat Leaders' Guide (CLG) project to produce a modular job performance aid system for combat leaders to use during periods of high stress in continuous combat.

RP 88-15 Handbook for Quantitative Analysis of MANPRINT Considerations in Army Systems, Lowry, J.C.; Seaver, D.A. June 1988. (AD A199 620) This handbook briefly explains the necessity of including measures of soldier performance in forecasts of battlefield system performance. Then it presents a method for calculating estimates of manned system performance in the dimensions of effectiveness ("How well does it work when it works?") and availability ("How often does it work?"). The two equations are based on existing approaches for evaluating effectiveness and availability, but are modified to include estimates (based on actual measurements) of the probability of soldier performance satisfying both time and accuracy standards. Data sources (including operational testing) are discussed, and the user is led, step-by-step, through the calculations. A complete example of both calculations, using hypothetical but realistic data, is presented for the MANPACK Army User Equipment (AUE) of the GPS NAVSTAR system. After both effectiveness and availability calculations are made, use of the equations is demonstrated in an analysis mode for identifying which of the six domains of MANPRINT (manpower, personnel, training, human factors, system safety, and health hazards) may present performance problems.

RP 88-16 VARWARS Exercise Evaluation Procedure Process Rating Scales Users' Guide, Garlinger, D.K.; Lussier, J.W. July 1988. (AD A198 937) The Director of the Combined Arms and Services Staff School (CAS3) requested assistance in conducting an evaluation of the school's present curriculum for teaching group problemsolving -skills. The request necessitated the development of a methodology to measure these skills. This report and its companion entitled, "VARWARS: A Group Problem Solving Exercise," document the methodology and provide guidance for implementation. This report contains rating scales tailored to the "VARWARS" problem. The scales are used to evaluate the actions taken by a group in developing a solution and certain behavioral descriptions to assist observers in making ratings. The manual also contains recommendations for use and suggestions concerning data analysis. Although the scales described in this manual are tailored to the VARWARS problem, most of the information can be used for evaluating other group problem-solving exercises. Footnotes indicate the changes necessary to adapt the scales to other problems.

RP 88-17 Design and Functional Specifications for the Simulation of the Commander's Independent Thermal Viewer (CITV), Quinkert, K.A. July 1988. (AD A201 419) The Commander's Independent Thermal Viewer (CITV) is a high-priority component of the Block II preplanned product improvements (P3I) for the M1 tank. Army developers have suggested that this addition will enhance the fighting ability of the tank by

providing increases of up to 40% in target acquisiton. This predicted enhancement was questioned, however, when several soldier-machine-interface (SMI) issues were raised. To address these SMI issues early in the acquisition cycle, research using simulation was proposed. This document was developed to provide Army contractors with design guidelines and function specifications of a generic CITV to be used in simulation. Contractors associated with the Development Simulation Networking (SIMNET-D) and the Unit Conduct of Fire Trainer (UCOFT) are considered the prime users of this document.

RP 88-18 Sources of Training and Lessons Learned Data From the National Training Center, Johnson, C.A. July 1988. (AD A201 420) This document delineates the training and lessons learned data requirements from the National Training Center in a format that can be easily referenced according to the source required to provide input data. The precision with which each data element should be collected is provided, along with the priority of the data elements collected with the Range Data Measurement System (RDMS). Implementation of the RDMS data requirements has already begun. Core Instrumentation System inputs can be made through improved software and operation procedures. Implementation of observer/controller input requirements will require an electronic clipboard; other data will require extensive resource commitment to attain.

RP 88-19 Design Guidelines and Functional Specifications for Simulation of the Battlefield Management System's (BMS) User Interface, Lickteig, C.W. July 1988. (AD A201 189) This report provides simulation network (SIMNET) designers with a set of guidelines and functional specifications for developing a simulated interface to the Battlefield Management System (BMS) which exemplifies the vehicle-based automated command, control, and communication (C3) systems anticipated for lower echelons of the Manuever Force. The interface includes the system's display of both text and graphic battlefield information and the display features and control functions available to the user for inputting and receiving additional C3 data. The design guidelines and functional specification presented in this report are based on (1) formally established guidelines for interface design taken from the human factors literature and (2) the users' current estimate of their interface requirements for automated C3 systems. The objective is to initiate the development of a simulated BMS interface that can be rigorously evaluated and modified with respect to soldier performance and training issues in the task-loaded environment provided by SIMNET.

RP 88-20 Canceled.

RP 88-21 Training Systems Concept for the Armored Family of Vehicles With Consideration of the Roles of Embedded Training and Stand-Alone Training Devices, Roth, J.T.; Cherry, W.P.; Strasel, H.C. September 1988. (AD A206 381) The Armored Family of Vehicles (AFV) is a new major acquisition program to build the next generation of armored vehicles. The goals of the program are to build the vehicles with the greatest commonality of parts feasible, for cost reasons, and to take advantage of technology advances as needed to meet the mid-1990s threat. This report presents the methods used, the analyses performed, and the resulting conclusions that formulate a hands-on training concept for the AFV in the institution and in the unit. The training media considered were alternative forms of embedded training and stand-alone training devices.

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RP 88-22 **Implementing Embedded Training (ET): Volume 2 of 10: Embedded Training as a System Alternative - Revised,** Strasel, P.C.; Dyer, F.N.; Roth, T.J.; Alderman, I.N.; Finley, D.L. September 1988. (AD A204 836) This research product is one of a series of 10 documents produced by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) and the project manager for Training Devices (PM-TRADE). The research will assist systems, training, and materiel developers in making the initial and iterative decisions to consider further the inclusion of embedded training in a given system development or improvement process. The product helps developers to answer four questions pertinent to the basic decision process: (1) Are there policy considerations that dictate the use of embedded training (ET) for knowledge and skill acquisition training in the system? (2) Do (many of) the proposed system's tasks require frequent sustainment training? (3) Is the development of an ET component feasible in this system? (4) Is it likely that ET will be a cost effective training alternative for the system? Guidance provided herein should apply to the system consideration to include embedded training within the total training system concept at any point in the LCSMM or ASAP of any new or existing system. The guidance will be as applicable to ECPs or PIPs and P3I as to the initial consideration of the training system for a new materiel requirement.

RP 88-23 **The Career Decision Survey Technical Manual,** Wilson, M.J.; Perry, M.S. October 1988. (AD A206 927) This report documents work conducted during Phase II of the Modeling the Individual Enlistment Decision project. This project investigates the career decisionmaking process of young adults. Respondents were asked about their beliefs, attitudes, intentions, and behaviors regarding career decisions. Three potential career decisions were investigated: obtaining a full-time civilian job, enrolling in college, and enlisting in the Army. This document reviews the survey methodology used for the survey and reports results of the data collection effort. Specifically, the development of the sample frame from two sources (i.e., a civilian sample source and a military-related sample source) is discussed. The development of the survey questionnaire is also discussed. The survey questionnaire content is based on findings from focus groups conducted with young people exploring the career decisionmaking process and on Fishbein and Ajzen's theory of reasoned action. The specific procedures used for data collection are described, including the processing specifications of the data received in the survey.

RP 88-24 **Implementing Embedded Training (ET): Volume 8 of 10: Incorporating ET Into Unit Training,** Strasel, H.C.; Strasel, B.; Aldrich, R.; Roth, J.T. November 1988. (AD A207 509) This document is the eighth in a series that provides guidelines and procedures for implementing Embedded Training (ET). It offers guidance for integrating ET considerations into Army unit training documentation—ARTEP mission training plans, and drill books. The guidance includes recommendations for appropriate content additions and modifications to developmental or revised unit training documentation, as well as the placement of that content in the format and structure of the unit training documents. To familiarize readers with the context in which these guidelines should be applied, the document contains a review of the Army unit training system and its components.

RP 88-25 **National Guard and Reserve Attrition Following Extended Annual Training Exercises: A Volume of Cross-Tabulations,** Nogami, G.Y.; Horne, D.K.;

Hydock, T.R.; Weyrauch, S. July 1988. (AD A208 156) In an attempt to identify reasons for attrition, 45 Army Reserve and Army National Guard units were surveyed during the summer and fall of 1987. These units had attended either the National Training Center, Blazing Trails, REFORGER, or normal Annual Training exercises between 1983 and 1986. One supervisor and one peer of each attritee were asked to identify the important reasons why that soldier left the unit. In addition, supervisors and peers were asked to rate the value of the exercise for unit retention and unit readiness. This report contains only the first level of findings and is intended only to be descriptive of the data set and methodology. No conclusions are presented in this first report.

RP 88-26 and 88-27 Canceled.

RP 88-28 Implementing Embedded Training (ET): Volume 5 of 10: Designing the ET Component, Roth, J.T.; Fitzpatrick, J.A.; Warm, R.E.; Ditzian, J.L. November 1988. (AD A205 697) This document describes guidelines and procedures for designing Embedded Training (ET) components. Beginning with Embedded Training Requirements (ETRs) developed by using Volume 4 of this series, a step-by-step process, leading to the development and documentation of a design concept, is provided. Phase 1 reviews and verifies previously identified ETRs. The second and third phases identify detailed requirements for ETR stimuli, performance measures, and feedback and recording, and compile the detailed requirements to form the ET component concept. Phase 4 identifies scenario control, data management, and special instructional features. Phases 5 and 6 are a direct review of the defined ET component characteristics by prime system engineers and preparation of final documentation including the ET component functional specification.

RP 88-29 Implementing Embedded Training (ET): Volume 4 of 10: Identifying ET Requirements, Roth, J.T. November 1988. (AD A205 752) A procedure for developing Embedded Training (ET) Requirements (ETRs) is presented. The procedure consists of four phases: The first two are directly analogous to task identification and task analysis as normally performaed in Instructional Systems Development (ISD) Front-End Analysis (FEA). The third phase nominates identified tasks and behavioral performance objectives for ET, based on their properties of criticality to successful mission accomplishment and perishability without periodic reinforced practice. Then, the nominated tasks and objectives are assessed for feasibility of implementation and for approaches that may later be adopted in an ET component designed to meet the identified ETRs. The fourth phase consists of preparing documentation for the identified ETRs. Techniques for computer database management to support the analysis process, and other tools helpful for analysis, are presented in three Appendixes.

RP 88-30 through 88-32 Canceled.

RP 88-33 Implementing Embedded Training (ET): Volume 6 of 10: Integrating ET With the Prime System, Evans, S.M.; Cherry, W.P. December 1988. (AD A207 982) This product identifies key factors and decision points that must be considered to ensure the successful integration of embedded training (ET) with the prime system. A descriptive model of ET is presented. The model outlines ET parameters and functions from two perspectives: the training developer, and the hardware and software developer. A common vocabulary

is defined to clarify communication between developers. The product also outlines critical integration issues derived from lessons learned in the ET development process and presents a generic set of questions for the Army to ask at design reviews to ensure ET progress.

RP 88-34 Implementing Embedded Training (ET): Volume 9 of 10: Logistics Implications, Cherry, W.P.; Peckham, D.S.; Purifoy, G.R., Jr.; Roth, J.T. December 1988. (AD A206 794) This volume addresses the special logistics implications of embedded training (ET). It shows that logistical developments and the prescribed processes to support a system that includes ET are similar to those for a system without ET. Normal logistics procedures will be followed for ET systems, as they are for systems without ET. Effectiveness of the procedures will be the same for systems with and without ET.
The major ET implications for logisticians fall into two basic categories:
1. development of appropriate usage factors for the system equipment (including the ET components) so that logisticians can calculate reliability, availability, and maintainability (RAM) factors; and
2. development of appropriate kinds and levels of postfielding logistical supports, including hardware, software, documentation, and training courseware support to provide total system support.

RP 88-35 Volume 10 of 10: Implementing Embedded Training (ET): Integrating ET Into Acquisition Documentation, Carroll, R.J.; Roth, J.T.; Evans, D.C.; Ditzian, J.L. December 1988. (AD A207 240) This document provides the reader with the information and perspective necessary to incorporate embedded training (ET) considerations into acquisition documentation. An overview of the Army systems acquisition process is presented, the relationships among the various documents of the acquistion process are described, and the relevant ET considerations at each phase, for each document, are specified. Detailed guidance for incorporating ET considerations and requrements into specific acquisition documents is provided. Recommendations are made for the development of Data Item Description (DIDs) to address ET considerations. Specification documents to ensure that ET is given sufficient consideration throughout systems design and acquisition are included. The document also provides recommendations and guidance for developing a Request for Proposal (RFP) for acquiring the ET component of aprime item system, including examples of statements addressing ET requirements for the Statement of Work (SOW) and System Specification sections of the RFP.

RP 88-36 MCS 2 Database Embedded Training (ET): Procedural Findings for Command and Control Systems, Ditzian, J.L.; Witus, G. November 1988. (AD A207 551) Embedded Training (ET), as an integral part of weapon system design, offers what appears to be a unique and cost
-effective training capability. ET was developed for the MCS 2 system to help validate a set of embedded training development procedures being undertaken in a concurrent program, "Systems Design Concepts to Support Embedded Training (ET)." MCS 2 is a battlefield management system under development by the Army Development and Employment Agency (ADEA). This effort resulted in the generation of computer-aided instruction (CAI) courseware, but did not succeed in implementing interactive ET, in which the trainee uses the operating

software under controlled conditions. The causative factors for this are documented as lessons to be integrated into the concurrent program.

RP 88-37 Boresight Equipment Testing Procedures, Perkins, M.S. July 1988. (AD A211 231) As part of boresighting the 25-mm gun of the Bradley Fighting Vehicle (BFV), the turret technical manual (TM 9-2350-252-10-2) describes how to test the accuracy of the boresight telescope. However, BFV literature does not provide accuracy tests for the 25-mm boresight adapter or the 25-mm boresight kit (adapter plus telescope). This pamphlet describes testing procedures for the boresight telescope, 25-mm adaptor, and kit. The kit test should be conducted prior to boresighting. Inaccurate kits should be reported through the chain of command to battalion. When inaccurate kits are reported, master gunners conduct separate accuracy tests of telescopes and 25-mm adaptors. Inaccurate telescopes and adaptors are reported using the quality deficiency report. Accurate equipment is used to form accurate 25-mm boresight kits. Testing procedures in this pamphlet will be included in the BFV gunnery field manual (FM 23-1).

RP 88-38 Boresighting and Weapons Ckeck With the Close-In Panel, Perkins, M.S.; Roberson, P.R. August 1988. (AD A211 292) A specially designed "close-in" panel can be used in boresighting the turret weapons and sights of the Bradley Fighting Vehicle. This paper, seeking to address problems that arise in boresighting, describes developed/modified design for panel, boresighting procedures, guidelines for making the panel, and procedures for conducting critical weapon system checks, including those for backlash, drift, equilabrator, and boresight retention.

RP 88-39 Procedure and Guidelines for Thermal Imaging, Rollier, R.L.; Champion, D.F.; Roberson, P.R.; Graber, J.G. August 1988. (AD A211 291) The thermal training package comprises a handbook and a slide presentation with accompanying script. The handbook contains a description of how the thermal sight works; a review of the thermal controls; and step-by-step procedures for obtaining an initial thermal image, for pre-marking control settings to facilitate obtaining a thermal image, and for scanning a sector; there are also guidelines to help gunners classify detections and estimate range. The scripted slide presentation shows BFV personnel the capabilities of the thermal sight and teaches them how to interpret a thermal image and recognize thermal cues.

RP 88-40 A Handbook for Producing Classroom Vugraphs, Ramsay, D.A.; Mirabella, A. September 1988. (AD A213 502) The handbook provides simple rules and suggestions for instructors and training developers producing vugraphs (overhead projection transparencies) for use in Army classrooms. Use of the handbook requires only simple cut-and-paste materials and access to a copying machine capable of handling film transparencies.

RP 89-01 Human Factors Guidelines for Command and Control Systems: Battlefield and Decision Graphics Guidelines, Lewis, H.V.; Fallesen, J.J. March 1989 (AD A207 284) These guidelines provide information to develop user-computer graphic interfaces. The focus is on the presentation of graphical charts used to display battlefield operations and resource data in ways that enhance fast and accurate perception, understanding, and use. The guidelines also apply to the presentation of battlefield situation displays, topographic and other

maps, and graphic symbology or icons used as components of the user-computer dialogue. The guidelines apply to the development of charts produced on paper, as well as static and dynamic computer displays. Guidelines for the selection of the most appropriate graphic form among bar and column graphs, line graphs, surface graphs, pie charts, flow charts, and three-dimensional graphs are provided. Details for construction, modification, and use of these various graphic forms are presented. Examples of each major variation of the graphic forms are illustrated using fictional military units and notional data relationships. Additionally, the guidelines provide recommendations for the selection and design of information codes, interaction techniques, overall screen layout, and other features of graphics. Intended users for the guidelines are system designers, application programmers, graphic artists, human factors specialists, software engineers, and others who participate in the development of command and control, decision support, or other information systems.

RP 89-02 Implementing Embedded Training (ET): Volume 7 of 10: ET Test and Evaluation, Purifoy, G.R., Jr.; Ditzian, J.L.; Finley, D.L. January 1989 (AD A207 290) This research product is one of a series of 10 documents produced by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) and the Project Manager for Training Devices (PM-TRADE). It offers guidance for combat and training systems developers, testers, and evaluators in planning and conducting a test and evaluation (T&E) program for embedded training (ET) as it is developed in concert with the operational system. ET-unique T&E issues and non-T&E needs are discussed in the context of the Army Streamlined Acquisition Program (ASAP) and the Life Cycle System Management Model (LCSMM). The report offers specific suggestions for the preparation of the Test and Evaluation Master Plan (TEMP) for ET components.

RP 89-03 FOG-M System Embedded Training (ET) Demonstration Courseware Outline, Ditzian, J.L.; Adams, J.E.; Sullivan, G.K. January 1989 (AD A207 291) Embedded training (ET), an integral part of weapon system design, offers a unique training capability. As part of the effort to develop ET for a demonstration FOG-M, this report presents an objectives hierarchy and a courseware outline. In addition a first draft of the objectives hierarchy required for all training for the fielded FOG-M system is presented.

RP 89-04 Draft Functional Specifications and Data Item Descriptions for FOG-M Embedded Training Subsystem, Carroll, R.J.; Harris, C.B.; Roth, J.T. January 1989 (AD A207 083) This research product presents an embedded training (ET) functional specification for a conceptual design of the FOG-M, as part of an ongoing effort to develop ET for a demonstration FOG-M system. The specification is presented in MIL-STD-490B2 format in order for it to compose a critical item development specification for ET functional requirements. Also included in the research product are two Data Item Descriptions (DIDS): Embedded Training Requirements Report, and Embedded Training Design Report. These are adapted from MIL-T-29053B(TD)-associated DIDs to reflect unique ET documentation requirements.

RP 89-05 Embedded Training Software Specifications for the FOG-M System Demonstration, Meerschaert, M.; Rainaldi, W.; Smith, R.; Thompson, D.; Frederick, C.; Wheaton, K.. January 1989 (AD A208 757) Embedded training (ET) concepts are under

investigation for the FOG-M system being developed by the U.S. Army Missile Command. This document presents ET software specifications for a demonstration of FOG-M. Specifications are included for embedded mission simulation, computer-aided instruction, and part-task training of the FOG-M gunner. The specifications are intended for use by FOG-M programmers who will design and code the ET software. The approach used in describing the software is that of structured specification.

RP 89-06 Human Operator Simulator (HOS) IV Programmer's Guide, Harris, R.; Kaplan, J.; Bare, C.; Lavecchia, H.; Ross, L.; Scolaro, D.; Wright, D.. January 1989 (AD A207 241) This report is a guide to maintaining and updating the source code for the Human Operator Simulator (HOS) IV, which was developed to aid in the design and evaluation of interfaces between operators or maintainers and weapon system hardware and software. HOS IV creates simulations of manned systems on an IBM-AT PC or compatible. It does this by using micromodels of basic human processes to produce both system and human performance estimates. HOS IV also includes a mechanism to aid in the creation of new micromodels.

RP 89-07 Development of the Automated Instructional Management System Data Set of the Officer Longitudinal Research Data Base, Ramsey, L.J.; Younkman, D.D. January 1989 (AD A207 213) The Officer Longitudinal Research Data Base (OLRDB) was developed to support research on U.S. Army commissioned officers. The Automated Instructional Management System (AIMS) Data Set of the OLRDB provides data on officers' performance in training courses conducted at Training and Doctrine Command (TRADOC) service schools and training centers. Data were collected from 11 TRADOC schools on officer performance in Officer Candidate School courses and in Officer Basic and Advanced courses for 13 career fields for 1985, 1986, and 1987. This report describes the contents and development of the OLRDB AIMS data set.

RP 89-08 Task Analysis of the UH-60 Mission and Decision Rules for Developing a UH-60 Workload Prediction Model. Volume I: Summary Report, Bierbaum, C.R.; Szabo, S.M.; Aldrich, T.B. February 1989 (AD A210 763) A composite scenario was used to conduct a comprehensive task analysis of the UH-60 mission. The analysis used a top-down approach to identify the mission's phases, functions, and tasks. Nine phases, 34 segments, 48 functions, and 138 tasks were identified. The crewmember performing each task was identified, and estimates of the sensory, cognitive, and psychomotor workload associated with the tasks were derived. Estimates of the task times were also derived. The mission/task analysis data were used to develop a computer model of workload for UH-60 crewmembers. The model used a bottom-up approach to build mission functions from tasks and mission segments from functions. Decision rules were written to specify the procedure for combining the tasks into functions and the functions into segments. The model permitted an analysis of total workload experienced by each crewmember in the performance of both sequential and concurrent tasks.

RP 89-09 Catalogue of MANPRINT Methods, Bogner, M.S. February 1989 (AD A208 236) This catalogue consists of descriptions of current and forthcoming MANPRINT methods developed by the Army Research Institute (ARI) or by ARI along with another agency. The methods are categorized as currently available or anticipated, with date of availability included. Each method is described in terms of the aspect of MANPRINT for which it is

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appropriate; the equipment necessary for using it; the input, processing, and output of the method; the use of the output; the stage of development; and how to obtain it. Reference and alternative or comparable approaches are provided when available.

RP 89-10 Selection of a Computer-Based Training Authoring System: Functional Requirements and Evaluation Criteria, Park, O.; Seidel, R.J. February 1989 (AD A207 141) A computer-based training (CBT) authoring system is a special kind of software tool kit for training developers to use in CBT materials. Since the late 1970s, many CBT authoring systems have been developed that serve the same purpose but have different theoretical approaches, functional features, and power. Thus, selection of an authoring system requires a systematic evaluation. This paper proposes a set of evaluation criteria for selecting an authoring system on the basis of its functional capabilities. A CBT authoring system can be evaluated according to the following criteria:
1. its functional capability to provide computer programming aids for a training developer with minimal or no programming skills;
2. the quality of instructional design guidance available for the training developer with limited experience in instructional design and training development;
3. the system's flexibility to expand its functional capability through interface with other software tools and hardware peripherals;
4. the ease with which the system can be learned and used; and
5. the cost, including price, hardware requirements, contract conditions, and training expenses. Although the five criteria listed above provide basic information for evaluating an authoring system, other factors unique to the given situation should be considered in the selection of a system. Other important factors include training and experience of the developers; characteristics of the subject domains; goals and objectives of the CBT programs; existing hardware and software; expected period and frequency for using the system. Also it should be noted that the five evaluation criteria are not completely independent of each other. Ultimately, the relative weights of the various criteria are based on the subjective judgment of the training developers and managers. To aid this judgment, we propose a combined evaluation approach of checklist and benchmarking.

RP 89-11 Human Factors Design Criteria for Future Systems. Report No. 4: FAADS Design Criteria Evolving From the Sgt. York Follow-On Evaluation I, Muckler, F.A.; Babbitt, B.A.; Seven, S.A. May 1989 (AD A210 356) Fifty-one human factors design problems reported from the Sgt. York Follow-On Evaluation (FOE) I are examined with respect to the driver's station (20 problems) and the crew compartment housing the squad leader and gunner (31 problems). Each design problem is compared with human factors criteria from MIL-STD-1472C and MIL-HDBK-759A to determine the adequacy of currently available design criteria. Where existing design criteria were inadequate or nonexistent, proposed changes and additions are presented. The purpose of this work is to provide human factors design criteria for future Forward Area Air Defense System (FAADS) with respect to improved soldier-machine interfaces.

RP 89-12 Canceled.

RP 89-13 Army Research Institute Validation-Estimation System (ARIVES) User's Manual, Kaplan, J.D.; MacLay, N.; Chaloux, D. May 1989 (AD A211 173) The existence of an accurate task analysis is a fundamental requirement for developing and evaluating training, function allocations, person-machine interfaces, personnel and manpower requirements, and test plans. To develop an accurate task analysis, one must identify missions, functions, tasks, and conditions that apply to a system; determine how these applicable items relate to each other; and validate the related, applicable items that have been identified. ARIVES (Army Research Institute Validation-Estimation System) is a method that uses a computer network to create and Validate Hierarchical task analyses. It is designed to reduce the time and difficulty of data collection and analysis and runs on a VAX minicomputer. This document is the ARIVES User's Manual.

RP 89-14 Battle Scenarios To Exercise Division Staffs, Fallesen, J.J.; Michel, R.R.; Carter, C.F., Jr. May 1989 (AD A210 621) For this research, two battle scenarios for exercising division staffs were developed. The scenarios are set in Western Europe, employ Army units under current J-series (i.e., October 1986) tactical organization, reflect Air-Land Battle doctrine, and incorporate current Soviet doctrine and organization. The scenarios support division-level tactical planning in the operations (G3) and intelligence (G2) staff areas. Information is provided to describe the intent, organization, and content of the scenarios. Typical staff products developed under the effort (intelligence estimate, operations estimate, and operations order) are described and suggested as comparisons for evaluation when the scenarios are used. With the information available in this report, the value of these scenarios can be determined for various, potential applications.

RP 89-15 and 89-16 Canceled.

RP 89-17 Human Factors and Safety Evaluation of Apache (AH-64) Attack Helicopter, Buckalew, L. June 1989 (AD B141 962) The AH-64 Apache Attack Helicopter is a sophisticated and lethal weapon system capable of supporting combat ground operations and engaging targets behind enemy lines and beyond the range of armor and artillery. Developmental and operational testing of the AH-64 indicated a number of human factors and safety deficiencies. As fielding of the Apache began in 1986, it became important to determine if these deficiencies had been corrected, a task encompassed within the Attack Helicopter Battalion Training Validation (AHBTV) conducted at Fort Hood, Texas, in midyear 1986. The Army Research Institute (ARI) Fort Hood Field Unit was asked to investigate eight areas of deficiency: (a) operation of tail wheel locking mechanism, (b) pilot's forward visibility, (c) seat comfort and ventilation, (d) intercom switch location, (e) reflected glare on canopy, (f) instrument readability, (g) antenna location, and (h) Integrated Helmet and Display System (IHADSS) problems. Air and ground crew confidence in AH-64 systems and equipment was evaluated by ARI, along with over 40 previously identified problems not addressed in the Test Design Plan. Two questionnaires using either dichotomous or scaled response alternatives were administered to 42 pilots and copilots (who also served as gunners) and 23 ground crewman following their unit's Army Training Evaluation Program to obtain evaluations of the existence and severity of identified problems. Approximately 70% of all questionnaire items resulted in response distributions that indicated that problems still existed. A large number of perceived problems were recorded for pilot forward visibility, seat comfort, and reflected

glare and reflection on the canopy. Some degradation in instrument and display readability, particularly in direct sunlight, was reported. Several helmet (IHADSS) problems were perceived, and one antenna was viewed as susceptible to damage. Of the 41 problems identified in previous research, over 70% continued to be identified as problems.

RP 89-18 Canceled.

RP 89-19 Human Operator Simulator (HOS) IV User's Guide, Harris, R.; Kaplan, J.D.; Bare, C.; Iavecchia, H.; Ross, L.; Scolaro, D.; Wright, D.. June 1989 (AD A212 007) This is the user's guide for the Human Operator Simulator (HOS) IV. HOS IV was developed to aid in the design and evaluation of interfaces between operators or maintainers and weapon system hardware and software. HOS IV can be used to simulate manned systems on IBM-AT or compatible computers by producing both system and human performance estimates based, in part, on micromodels of basic human processes. A set of micromodels is included in HOS. The user's guide provides the information required to install HOS, create new simulations, create new micromodels, edit existing simulations and micromodels, and run HOS simulations.

RP 89-20 Questionnaire Construction Manual, Babbitt, B.A.; Nystrom, C.O. June 1989 (AD A212 365) This Questionnaire Construction Manual is a revised version of a 1976 manual. The latest research methods for developing questionnaires are presented. The manual was designed to guide individuals who develop and/or administer questionnaires as part of Army field tests and evaluations. The content is applicable to many nonmilitary applications.

RP 89-21 Questionnaire Construction Manual Annex Questionnaires: Literature Survey and Bibliography, Babbitt, B.A.; Nystrom, C.O. June 1989 (AD A213 255) This report is an annex to the companion volume, "Questionnaire Construction Manual," published in 1985 by the U.S. Army research Institute for the Behavioral and Social Sciences (ARI). It is designed to present summaries of the latest research findings related to developing questionnaires. Although both volumes were prepared primarily for personnel engaged in developing questionnaires for use in military tests and evaluations, the content is equally applicable to many nonmilitary areas.

RP 89-22 Canceled.

RP 89-23 Joint Service Multipurpose Arcade Combat Simulator (JMACS) User Guide, Heller, F.H.; Evans, K.L. July 1989 (AD A212 773) The Multipurpose Arcade Combat Simulator (MACS) is a part-task weapons trainer that consists of a microcomputer, video monitor, program cartridge, and long-range light pen mounted to a demilitarized weapon. Although designed to provide inexpensive training with a variety of weapon systems, interest has focused largely on its use as a rifle marksmanship trainer. Because of U.S. Army, Navy, and Air Force interest in the potential applications of MACS Technology in their respective weapons training programs, a 2-year Joint Service MACS (JMACS) program was initiated in 1986. The JMACS User Guide was developed to support instructor training before user testing in each Service. It presents information on system assembly, operation, and troubleshooting. JMACS training software and associated performance standards also are described.

Research Reports

RR 1378 Target Acquisition Analysis Training System: Evaluation of the Basic Thermal Combat Vehicle Identification (TCVI) Training Program, Smith, N.D.; Shope, G.L.; Heuckeroth, O.H.; Warnick, W.L.; Essig, S.S. November 1987. (AD A192 488) Thermal (IR) sighting systems are used on a variety of weapons systems, such as the M1 Tank, the M2 and M3 Infantry Fighting Vehicle, the TOW, and the improved TOW. However, no standard training program that trained the thermal sight operator to recognize or identify the targets with these sights existed. A vehicle recognition and identification training program utilizing simulated thermal images was developed and tested. The Basic Thermal Combat Vehicle Identification (TCVI) Training Program was designed to be compatible with the Army's Combat Vehicle Identification (CVI) Training Program (GTA 17-2-9), through use of the same 30 vehicles and training format. The TCVI training was evaluated in the 8th Infantry Division, Germany, where 123 soldiers were pretested, trained, and posttested. Performance was measured by the correct number of vehicle recognition and identification responses. A significant performance change was obtained when a comparison of pretest and posttest scores was made. It was concluded by the TRADOC Combined Arms Center (CAC), the proponent, that the Basic Thermal Combat Vehicle Identification (TCVI) Training Program simulations of thermal images were realistically adequate and that the program was satisfactory for use in training soldiers in vehicle recognition and identification. The program was adopted for Army-wide use as GTA 17-2-10.

RR 1379 to 1388 1984 publications.

RR 1389 to 1407 1985 publications.

RR 1408 1984 publication.

RR 1409 1985 publication

RR 1410 Canceled.

RR 1411 to 1414 1985 publications.

RR 1415 Canceled.

RR 1416 1984 publication.

RR 1417 1985 publication.

RR 1418 Recommendations for Improved Performance Appraisal in the Federal Sector, Steinberg, A.G.; Burke, W.P. January 1986. (AD A168 777) Federal agencies covered by the Civil Service Reform Act of 1978 are required to have performance appraisal systems that are to be used as a basis for personnel actions such as training, rewarding, promoting, and removing employees. As such it is essential that the performance appraisal systems be viewed as effective by both supervisors and subordinates. In order to identify the

features of performance appraisal systems that are particularly effective and which also meet the legal requirements for these federal agencies, a review of the performance appraisal literature was conducted and federal-sector subject-matter experts were interviewed. The recommendations derived from the literature review and interviews were organized around the following nine themes: legal requirements, user perspective, the role of top management, appraisal as a management tool, linkage to organizational goals, adaptation to organizational needs, system perpetuation, training, and ease of use.

RR 1419 Development of a Performance-Based Program for U.S. Army ROTC Leadership Training, by Sgro, J.A.; Dobbins, G.; Pence, E.C. January 1986. (AD A167 938) This report describes the steps that were taken in developing and evaluating a conceptual and experimental approach to leadership training at the ROTC level. *U.S. Army ROTC Leadership Development: A Performance-Based Program* consists of two documents: a Student Manual and an Instructor Manual. The Student Manual involves the presentation of: (1) the platoon leadership experience; (2) the theoretical basis for effective platoon leadership; and (3) instruction and exercises in the skills that are necessary for effective platoon leadership. The Instructor Manual provides lesson plans and guidance for using the program. The program received field evaluations during 1981, 1982, and 1983. The report presents the reactions given to the program and a discussion of changes that were made. In addition, a description of the teaching materials currently being used for leadership training by ROTC detachments is presented.

RR 1420 Senior Leadership Performance Requirements at the Executive Level, Jaques, E.; Clement, S.; Rigby, C.; Jacobs, T.O. January 1986. (AD B103 760) This report deals with the changing nature and increasing complexity at the various GO/SES levels. A general theory of organizational structure is proposed which would facilitate leader development and provide information and decision systems support for executives. A program of action is posited based on findings from interview data which lays out major systematic leadership requirements for a hierarchy of levels of work. Higher level work (structured within a joint, combined, and unified command) is characterized as requiring an international perspective and collegiality. Professional development and competency requirements at the top-most levels are consistent with a time horizon of 20 years or more.

RR 1421 A Preliminary Evaluation of a Model Maintenance Training Program for Reserve Component Units, Graham, S.E.; Shlechter, T.M.; Goldberg, S.L. February 1986. (AD A173 909) The Model Training Program for Reserve Component Units (MTP-RC) is developing and evaluating computer-based maintenance simulation training for M1 turret and hull mechanics at the organizational and DS/GS levels. This report describes the courseware and a small-scale preliminary evaluation of the courseware's training effectiveness. Soldiers who received the simulated troubleshooting training made fewer errors per period of time on the hands-on transfer task than did control soldiers. The skills and knowledge developed in the courseware also generalized to a troubleshooting task not specifically trained. Apparent success of the program is attributed, in part, to the iterative review process that paired Instructional Designers with Army Subject Matter Experts during courseware development. The resulting training program is exportable, requires a minimum of trained instructors, and trains M1 maintenance skills on equipment not physically available.

RR 1422 The Unit-Conduct of Fire Trainer (U-COFT) as a Medium for Assessing Gunner Proficiency: Test Reliability and Utility, Graham, S.E. March 1986. (AD A169 196) A device-mediated M1 tank gunnery test was developed for administration on the Unit-Conduct of Fire Trainer (U-COFT). The purpose of the research was to examine the reliability of the test, and to assess the utility of the test for estimating gunners' proficiency independently of the Tank Commander's (TC) contribution. The reliability of six of nine U-COFT measures exceeded .70. The Gunners' hit rates were found to be heavily influenced by the TCs' performance, including the Tcs' ability to train. The results show that TC performance must be stabilized if the U-COFT tests are to be used to assess Gunners' performance alone. Recommendations were made as to how the U-COFT could be efficiently used in units as a training and testing device.

RR 1423 Training Analysis and Design for Remedial Computer-Assisted Instruction for Tank Commanders, Knerr, C.M.; Elder, B.L.; Campbell, R.; Harris, C.D.; Stein, D.J.; Sticha, P.S.; Morrison, J.E.; Russo, R.P. March 1986. (AD A174 854) The Fort Knox Training Technology Field Activity (TTFA) is a cooperative activity of the Training and Doctrine Command (TRADOC), the United States Army Research Institute (ARI), and the United States Army Armor Center (USAARMC). Since its inception in November 1983, the mission of the TTFA has been the application of emerging technology to Armor school training. The initial focus of the Fort Knox TTFA is the Basic Noncommissioned Officer's Course (BNCOC) training M1 tank commanders (MOS 19K). The overall scope for this project produces the design, development, and evaluation of a computer-based course management (CM) system for the 19K BNCOC and computer-assisted instruction (CAI) for tasks prerequisite to the 19K BNCOC course. The project consists of the following six tasks:

> Task 1: Analysis and Design of the CM System.
>
> Task 2: Analysis and Design of Remedial CAI.
>
> Task 3: Development of CM System.
>
> Task 4: Development of Remedial CAI.
>
> Task 5: Implementation and Evaluation of CM System.
>
> Task 6: Implementation and Evaluation of CAI.

This report describes the Task 2 activities undertaken to analyze the primary task-specific remedial training needs of students entering 19K BNCOC and design individualized interactive CAI to satisfy those needs.

RR 1424 Information Requirements for Battlefield Management System: Survey and Prototype Evaluation, Jobe, J.B. June 1986. (AD A178 502) Two survey projects that evaluated information requirements for platoon leaders, platoon sergeants, and wingmen for a Battlefield Management System are reported. In Survey I, 30 armor officers and NCOs rated 34 information items on the basis of their necessity for mission accomplishment. Ratings were compared to the ratings of a group of four subject matter experts (SMEs). Results indicated that there was substantial agreement among raters for information requirements for the three duty positions and that there was substantial agreement between players and SMEs on the overall priorities. The information items common to top 10 ratings of both groups were (1) critical situation alert, (2) concept of operations, (3) heading reference/navigation, (4) call for fire, (5) command mission, and (6) reports (format). In Survey II, 16 of the 30

players participated in a demonstration of a Texas Instruments prototype system that presented these BMS information items: (1) aided navigation, (2) friendly positions, (3) enemy positions, (4) fuel status, (5) ammo status, (6) warning sensors, and (7) equipment failure. Players rated the priority of the seven elements equally and indicated that they would like the information displayed in two clusters, tactical and logistical. Results are discussed in terms of their relationship to duty positions.

RR 1425 The Leadership Improvement Modules of the Precommissioning Leadership Assessment Program, Burke, W.P.; Davis, P.K. February 1986. AD A171 422
The Leadership Assessment Program provides evaluation of officer training on 12 dimensions of leadership. A series of leadership training modules corresponding directly to the leadership dimensions of the Leadership Assessment Program were developed using the behavior modeling approach to training. Principles of behavior modeling incorporated into each lesson included (1) modeling of behaviors to be learned, (2) behavioral rehearsal, (3) performance feedback, and (4) transfer of training. Modeling is accomplished by depicting Second Lieutenants interacting in realistic leadership situations and rehearsal is effected by having the student interact, through workbook exercises, in unfolding scenarios presented in the audiovisual slides. A narrator provides feedback on correct responses to the exercise problems. Transfer of training is provided for by directing the student to further developmental activities in which the student can participate in his/her duty environment. The modules were developed in Training Extension Course (TEC) lesson format, each being a self-instructional audiovisual unit of artwork, slides and accompanying narration.

RR 1426 A Comparison of Innovative Training Techniques at the Defense Language Institute Foreign Language Center, Bush, B.J. June 1986. (AD A178 452) This report documents the results of an evaluation of the comparative training effectiveness of (1) suggestopedia (i.e., a method proposed to accelerate language learning), (2) the standard instructional methodology currently used by the Defense Language Institute Foreign Language Center (DLIFLC), and (3) a flexible-scheduling version of the DLIFLC method (i.e., the flexibly scheduled presentation of material based upon group readiness). The subjects were 40 junior enlisted Army personnel scheduled to take the Russian Basic Course (RBC). They were randomly selected and sorted into two sections each for the suggestopedia and standard groups. One section of 10 junior enlisted Army and Navy personnel comprised the flexibly scheduled group. Analyses of variance, combined with subsequent one-tailed t-tests, found that the suggestopedia group had significantly lower scores than the two DLIFLC groups on the written and oral components of achievement tests. Similar significant differences among the groups were found on the reading and speaking components of the Proficiency Advancement Test (PAT). No significant differences were found among groups on the listening component of the PAT. There were no significant differences between the standard and flexibly scheduled groups on the achievement tests, the PAT, or on the face-to-face oral interviews. Comparisons among groups on the various attitudinal measures indicated significantly more positive attitudes by the suggestopedia group toward their instructor for the first 4 weeks when compared to the standard group. There were no differences between groups on any other results from the weekly surveys, and between pre- and posttests results for any of the groups. On the 12 individual scales comprising the end-of-course questionnaire, results were similar among groups on 9 of the scales. On the "Language Use Anxiety" scale, the suggestopedia group

indicated more comfort with the language; on the "Effort Required" scale, they felt that the methodology required little or no effort to learn the language; and on the "Course Materials" scale, the two DLIFLC groups felt more positive about their course materials. In conclusion, suggestopedia neither accelerated learning nor resulted in more overall positive attitudes in students when compared to either the standard or flexibly scheduled groups. The evaluation of the flexible-scheduling methodology did indicate a time saving of approximately 1 week.

RR 1427 Recommendations for "People Research and Development" Actions To Improve Army Reserve Component Readiness, Bynum, J.A.; Fischl, M.A. February 1986. (AD A172 678) Data and documentation published by the U.S. Army Force Command (FORSCOM) Headquarters were reviewed, FORSCOM staff personnel were interviewed, and other Department of Defense documents were reviewed and personnel interviewed. MOS qualification and personnel were cited as the most critical Manpower, Personnel, and Training issues limiting Reserve Component (RC) readiness in FY 83. Manpower strength may be more a function of policy and budget constraint, but there are indications that recruiting and retention are becoming problems. Training was not cited as a critical factor impeding readiness in the RC; however, the potential profit from training and human factors research and development is significant. A planned, systematic, program of research and development in recruiting, retention, motivation and morale would benefit the RC. The RC would benefit from a plan that would apply currently available training and human factors technology to the RC's unique troop and individual ready reserve issues, while simultaneously providing for testing and applying high technology as it become available.

RR 1428 A Profile of Army Families in USAREUR: Results of the 1983 Families in Europe Survey, Ozkaptan, H.; Sanders, W.; Holz, R. June 1986. (AD A175 454) Family wellness, partnership with the Army, and sense of community were identified as important Army family issues in the White Paper, "The Army Family," issued by the Chief of Staff in August 1983. This report presents the views and perceptions of over 1,000 Army families in USAREUR, both military members and spouses, with respect to family life in the Army and more specifically, family experiences associated with an overseas assignment. The data have been organized to serve as a reference source for Army planners and decision makers in their formulation and assessment of programs and policies that impact on Army families.

RR 1429 ROTC Achievement Testing Program: School Years 1983-1985, Hunter, F.T. August 1986. (AD A178 670) The Office of the Deputy Chief of Staff for Reserve Officers' Training Corps administered English, reading, and mathematics tests to Military Science I (MS I) and MS IV cadets to develop systematic information for formulating diagnostic and selection standards. The Army Research Institute analyzed the data. This report describes the score distributions for each MS class by gender, ethnic group, and academic major. There was little difference between average scores of males and females. However, the scores varied substantially among ethnic groups. The findings indicate that further information is needed before diagnostic and selection standards using these or other achievement tests can be set.

RR 1430 Preliminary Report on a National Cross-Validation of the Computerized Adaptive Screening Test (CAST), Knapp, D.J.; Pliske, R.M. August 1986. (AD A175 767) The Computerized Adaptive Screening Test (CAST) is used by Army recruiters to

predict prospective applicants' (i.e., prospects') subsequent performance on the Armed Forces Qualification Test (AFQT). A modified version of the CAST software was used in 60 recruiting stations across the country from January through December 1985 to collect cross-validation data. Recruiters in these test stations also recorded test scores for prospects given CAST's paper-and-pencil counterpart, the Enlistment Screening Test (EST). All test data were matched to applicant tapes from Military Entrance Processing Stations (MEPS) to obtain AFQT scores and relevant demographic data. Analyses indicate that both CAST and EST are good predictors of AFQT performance. Alternative CAST subtest lengths were also examined, and the current operational subtest lengths appear to be optimal. Analyses of CAST's accuracy in predicting prospects' subsequent classification into important AFQT categories (i.e., 1-3A and 3B) are also discussed.

RR 1431 The Training Implications of Directed Energy Weapons for the U.S. Army: A Preliminary Report, Bayer, G.C. October 1986. (AD A179 827) This report addresses the need to fill information gaps in training and doctrine on directed energy. A comprehensive presentation of nonclassified descriptions of directed energy types, employment possibilities, and appropriate countermeasures serves as the major portion of this report. Directed energy proliferation on the battlefield is a critical issue faced by commanders and soldiers alike. The results of a pilot test suggest that relatively simple training that can minimize directed energy weapon effectiveness on individual and crew performance can be developed and presented to soldiers. A closing issue is discussion of directed energy to generate widespread understanding of directed energy effects and capabilities and the need to reconsider the classification level of some information. A large body of directed energy information is currently held as sensitive when in fact it could be made available to concerned field commanders and trainers in a general format. Specified classified details could easily remain sensitive while the release of common knowledge would permit trainers to develop comprehensive responses to the directed energy threat.

RR 1432 Task Analysis of Tactical Leadership Skills for Bradley Infantry Fighting Vehicle Leaders, Salter, M.S.; Rollier, R.L.; Morey, J.C. October 1986. (AD A180 681) This report presents a task analysis of the Tactical Leadership Skills of Bradley Infantry Fighting Vehicle leaders. The task list was examined for critical training requirements, and requirements for training device support of this training were identified. Existing and projected training devices and materials were examined for adequacy in meeting each of the requirements, and recommendations were made on the identity and characteristics of devices required to support Bradley leader training. The task lists, covering squad through battalion level, provide a generic listing of a set of mechanized infantry leadership tasks, and can be used as a data base for other tactical training and testing program developments.

RR 1433 Development of a Stadiametric Ranging Device for the M203 Grenade Launcher, Morey, J.C.; Schendel, J.D.; Heller, F.H. October 1986. (AD A180 920) This research sought to improve performance on the M203 grenade launcher through the development of a simple, low-cost range estimation device using stadiametric principles. Experiment 1 established the baseline unaided range estimation capability of grenadiers who were newly weapon qualified. Experiment 2 was a pilot test of a prototype stadiametric ranging device that used hole sizes scaled to each of 10 man-sized targets located between 50 and 350m

from the firer. On the basis of systematic perceptual errors associated with the original device, corrections to the hole sizes were calculated and incorporated into a corrected device. Experiment 3 compared both these devices using experienced soldiers, who provided unaided eye range estimations as the baseline. Range estimates with the unaided eye were overestimations of ranges and those with the devices were underestimations. The magnitude of range estimation errors was smaller and showed less variability through use of the devices than with the unaided eye. Outbound targets yielded less range estimation error than inbound targets with the naked eye. In contrast, inbound targets yielded less estimation error than outbound targets for both ranging devices. The influence of the direction of target movement on range estimates is discussed in the context of known sources of error in stadiametric devices and design features of the prototype devices.

RR 1434 Human Factors Assessment: Light Armored Vehicle, Maintenance/Recovery Vehicle (LAVM/RV), Krohn, G.S. December 1986. (AD A181 149) This report describes the human factors evaluation of the Light Armored Vehicle Maintenance/Recovery Vehicle (LAVM/RV) that took place at Twentynine Palms, California, from December 1983 to April 1984. The evaluation was in conjunction with Operational Test II of the LAVM/RV conducted jointly by the Marine Corps Operational Test and Evaluation Agency (OTEA) and the Army OTEA. The report documents man-machine interface and safety problems recommended for correction before full-scale production if maximum effectiveness is to be realized.

RR 1435 A Research Concept for Developing and Applying Methods for Measurement and Interpretation of Unit Performance at the National Training Center, Forsythe, T.K. January 1987. (AD A181 073) This report describes a research concept for accomplishing the task of developing and applying methods for measuring and interpreting unit performance at the National Training Center (NTC). The plan presents the background, methods, procedures, resource requirements, and resulting research products of this research effort.

RR 1436 Implementation of a Cognitive Skills Training Program in ROTC: The Leadership Enrichment Program, Twohig, P.T.; Rachford, D.L.; Savell, J.M.; Rigby, C.K. March 1987. (AD A181 981) This report describes the implementation and evaluation of the Leadership Enrichment Program (LEP), an application of the Instrumental Enrichment Program, designed to increase the cognitive performance of ROTC cadets. Steps to ensure a strong implementation in 11 ROTC programs were defined and executed. Although the project was cancelled after one year due to priorities, the initial results indicated positive effects on cadet cognitive performance and acceptance of the program by students and instructors.

RR 1437 Training Needs Assessment and Technology Transfer in USAREUR: 1985, Sanders, W. March 1987. (A185 469) Armor and Infantry training information needs identified by U.S. Army Europe (USAREUR) training managers are presented. Efforts to respond to these needs with existing ARI products are discussed. Transfer of emerging training products from the ARI Work Program to USAREUR for review is described. Several training device programs currently being previewed for USAREUR input are presented.

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RR 1438 Grouped Versus Individualized Computer-Based Instruction (CBI) Training for Military Communications, Shlechter, T.M. April 1987. (A182 171) A series of studies were conducted at the Army Research Institute's Fort Knox Field Unit which investigated the effectiveness of a computer-based instruction (CBI) courseware for training Military Communications to 19K BNCOC (Basic Non-commissioned Officer's Course) students. This investigation also examined the instructional potentials of packed or grouped (i.e., several students at a terminal) versus individualized CBI training. Sixty-nine soldiers (E4 to E6 level NCOs) participated in three studies in which CBI training was provided in Military Communications. Studies 1 and 2 involved examining differences in soldiers' learning on a BNCOC performance test as a function of the CBI courseware and as a function of grouped versus individualized CBI training. The third study examined the viability of having the BNCOC instructors implement this courseware and the viability of using group CBI training in a regular 19K BNCOC class. This investigation's findings have shown that this CBI courseware is effective for training 19K BNCOC students in Military Communications and that grouped CBI training appears to be preferable to individualized CBI training for this courseware.

RR 1439 Simulation in Combined Arms Training: A Platoon-Level Battlefield Simulation, Kristiansen, D.M. April 1987. (AD A182 172) This report describes the development and preliminary evaluation of a tank platoon-level battlefield simulation for training command and control skills in a classroom environment. Functional requirements for terrain, movement, detection/identification, engagement, indirect fire, communication, resource audits, postsimulation feedback, and the realization of these functional requirements are covered in detail. The system is described in terms of its hardware and operating characteristics. The results of pilot trials with lieutenants from the Armor Officer Basic Course and intact platoons (vehicle commanders only) from an operational tank battalion are described. The development of a Single Tank Tactical Exercise and the results of its use with students from the MOS 19K Basic Noncommissioned Officers Course (the M1 Abrams Tank Commander) are described.

RR 1440 National Training Center, Joint Readiness Training Center, and Home Station-Based Research Program Products, McFann, H.H.; Williams, R.K., Jr. April 1987. (AD A182 173) This report presents a current summary of research products from the Army Research Institute National Training Center, Joint Readiness Training Center, and Home Station-Based Research Program. This research is a joint endeavor by the Army Research Institute (ARI) and the Combined Arms Training Activity (CATA). This integrated research program focuses on the development of a unit performance measurement system and determination of home-station predictors of unit performance effectiveness at the NTC. These elements are critical to the assessment of Army readiness and determination of needs related to doctrine, organizations, equipment, training, and soldier performance. This report describes research products that have been completed and provided to Army users, and ongoing research in support of the Center for Army Lessons Learned (CALL), the National Training Center Operations Group, and the Deputy Chief of Staff for Personnel. Research has proven the usefulness of the training data derived from the NTC in analyzing Army issues and developing lessons learned. Research efforts are continuing to further refine the data collection procedures and develop a user-friendly data base more responsive to research needs.

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RR 1441 Development of Behavior-Based Rating Scales and Analysis of Recruiter Selection Battery Data for the Army Recruiter Job, Borman, W.C.; Russell, T.L.; Skilling, N.J. May 1987. (AD A184 497) One purpose of the present research was to develop behavior-based rating scales for evaluating enlisted Army recruiter performance. To accomplish this, rating scales developed previously for Navy recruiters were revised with the help of experienced Army recruiters. Retranslations of Army recruiter performance examples into the Navy recruiter dimensions and the final revised behavioral anchors into the same dimensions suggested that: (1) the Navy's eight-dimension description of recruiter performance requirements is appropriate for Army use and, (2) the final Army recruiter scales with revised definitions and anchors provide a relatively unambiguous depiction of the various performance areas for this job, as well as the effectiveness levels within each area. A second purpose here was to initiate evaluation of the experimental Recruiter Selection Battery (RSB-X) for use in identifying persons with high potential for Army recruiting. Toward this end, the RSB-X was administered to 417 trainees in the Army recruiter school. Responses to the RSB-X were scored on four keys developed previously to predict performance in Navy recruiting, and these scores for the Army sample were compared to scores on the same keys obtained by Navy recruiters in a 1977 sample (N = 194). Total scores across all four keys were very similar for the Army and Navy samples. However, on three of the four keys, Army mean scores were significantly different from Navy means. Factor analyses of correlations between keyed items for both the Army and Navy samples revealed factors that were readily interpretable and were similar across the two samples. These factors potentially indicate underlying personality constructs important for success in military recruiting. The Army recruiter rating scales should be used in future personnel research when performance scores for individual recruiters are required. They might also be used for recruiter assessment to target professional development and growth interventions. Finally, after additional research, the RSB-X could be employed to help identify Army enlisted personnel likely to perform effectively as recruiters.

RR 1442 Review of U.S. Armor Crew and Platoon Training in Preparation for the 1985 Canadian Army Trophy (CAT) Competition, Black, B.A.; Abel, M.H. May 1987. (AD A185 470) Three US Armor units participated in the 1985 Canadian Army Trophy (CAT) competition. This competition provided a unique opportunity to evaluate tank gunnery training strategies and crew selection practices. The results of analyses comparing performance in training with performance in the competition and the results of interviews with unit cadre are presented. Findings indicated that measures of gunnery speed in training correlated with CAT performance, while measures of accuracy did not. Analyses of Armed Services Vocational Aptitude Battery (ASVAB) data of crewmen selected for CAT failed to support the findings of previous research (Wallace, 1982). Crews commanded by higher mental category (Armed Forces Qualification Test) tank commanders did not perform better than crews commanded by lower mental category commanders. Failure to find this difference was attributed to two potential sources: a) units attempted to institute a selection policy requiring high composite tank commander/gunner ASVAB scores and b) units trained to high levels of performance. Results of interviews with company cadre note the advantage of mixing device-based and tank-based training programs. This prevents overlearning simulation (device-based) specific skills and maintains variety in the approach to training. The authors suggest that while CAT offers an excellent opportunity to study advanced gunnery training, some

methods may be unique to the CAT environment and not generalizable to the normal TO&E Armor unit training structure.

RR 1443 The Development of a Single Tank Tactical Exercise for Training M1 Tank Commanders, Drucker, E.H.; Morrison, J.E. June 1987. (AD A189 482) An analysis was conducted of the basic NCO course for training M1 tank commanders (19K BNCOC) in terms of the crawl-walk-run approach to training. The results of the analysis showed only partial correspondence between tasks trained in the classroom and those trained in the field. To increase the correspondence between tasks included in different phases of training, two versions of a new tactical exercise were developed. In contrast to previous field exercises, which were conducted in a platoon context, the new exercise was designed for implementation by a single tank. A field version of the exercise was designed to make student performance more observable by instructors. A second version of the exercise was designed for implementation on a battlefield simulation in order to facilitate the transition from classroom to field training.

RR 1444 Remedial Skills Training: An Evaluation of Computer and Videodisc-Based Courseware, Lickteig, C.W.; Burnside, B.L. July 1987. (AD A190 832) This research effort evaluated the training effectiveness of computer and videodisc-based instruction (CVBI) for training a set of remedial tasks that are prerequisite skills for M1 tank commanders. The evaluation used a pretest versus posttest design, and all training and tests were delivered on-line by a computer delivery system. Control conditions were included to ensure that improvements on posttest measures were due to training effectiveness rather than participants' increased familiarity with the test formats and/or the computer delivery system. Results for the four remedial tasks included in this evaluation—Use Visual Signals, showed significant improvements in posttest performance. In addition, participants' subjective evaluations of this CVBI clearly indicated they prefer CVBI over conventional training methods. While training efficiency could not be directly determined, the diversity of participants' need for remedial training strongly supports the adaptive nature of training technologies such as CVBI in the Army training system.

RR 1445 Canceled.

RR 1446 Effects of Revised Ammunition Reloading Procedures on Reload Time for the Bradley Infantry Fighting Vehicle, Rollier, R.L.; Salter, M.S.; Robertson, P.R.; Morey, J.C. July 1987. (AD A191 453) The Bradley Fighting Vehicle must be reloaded in the shortest possible time because none of the weapon systems can be fired while the turret is in the reload position. Any reduction in time affects vehicle survivability. Modifications to the Bradley's reload equipment and procedures were tested with the following results: (1) shorter reload time; (2) greater number of rounds carried; (3) fewer personnel required to perform the task; and (4) simplified training. Results indicate further tests are merited.

RR 1447 An Overview of ARI's Research Program on the National Training Center: Symposium Proceedings, Banks, J.H.; Whitmarsh, P.J. August 1987. (AD A186 998) This set of papers presents an overview of the Army Research Institute's National Training Center (NTC) Research and Development Program. The papers were developed for a symposium conducted during the meeting of the Military Testing Association in October 1985. They

examine the nature of measurement and interpretation of unit performance, leadership measurement and development, types and quality of NTC information currently available for research, and analyses of battalion live-fire and force-on-force performance. Standardized procedures in support of NTC operations are recommended to improve both training and the NTC Lessons Learned program.

RR 1448 Cost and Perceived Effectiveness of a Remotely Conducted Command Post Exercise, Smith, G.W.; Hagman, J.D.; Bowne, D.S. August 1987. (AD A190 846) The purpose of the present research was to determine the feasibility of conducting a remote command post exercise (CPX) while identifying its relative cost and equipment requirements for long-distance communications. Elements of the 116th Armored Cavalry Regiment (ACR) of the Idaho Army National Guard traveled to Gowen Field, Idaho, to participate in a 3-day, simulated remote CPX. Regimental and Squadron Command Posts (CPs) were dispersed geographically to different locations in and around Gowen Field to simulate the long-distance, distributed environment of an actual remote CPX wherein participating units would intercommunicate from their respective home stations. The exercise was driven by the Computer Assisted Map Maneuver Simulation (CAMMS), the battlefield simulator, which supported the interaction of players (i.e., the 116th ACR), controllers (i.e., the 75th Maneuver Area Command (75th MAC) and Maneuver Training Command (MTC), and the computer support system itself, which furnished "real-time" feedback on battle status. Although the conclusions technically pertain only to the conditions under which the present CAMMS-driven CPX was conducted, they suggest that a significant savings could be achieved in the future by applying the concept of remote exercise delivery. Savings will be a function of how much travel and per diem costs can be avoided through the use of long-distance communications equipment such as that used here. These savings can be achieved under a remote scenario without having to modify basic exercise materials or encounter participant resistance to implementation. This information should assist the 75th MAC in its conceptual development of a Battle Projection Center capable of driving multiple, remote exercises simultaneously from a centralized location.

RR 1449 Training Command, Control, and Communication Skills on SIMCAT, Graham, S.E. August 1987. (AD A190 584) The Simulation in Combined Arms Training (SIMCAT) device has been developed by the Army Research Institute (ARI) as a research tool to investigate the feasibility of low fidelity microcomputer-based simulators for training Armor Command, Control, and Communications (C3) skills. This research evaluates a SIMCAT training package designed to train C3 skills to Tank Commanders (TC), including tasks identified as frequent problems for Armor units at the National Training Center. The results indicate that SIMCAT Single Tank Tactical Exercises (STTX) are an effective means for training novice and highly experienced TCs. The paper also discusses simulation requirement issues, additional SIMCAT training applications, and potential problems for implementing technology-based training.

RR 1450 Canceled.

RR 1451 Issues in Developing and Implementing Computer-Based Instruction for Military Training, Shlechter, T.M.; Burnside, B.L.; Thomas, D.A. September 1987. (AD A189 479) This report discusses the issues involved in fielding a computer-based instruc-

tion (CBI) program for military training. This report is based on a series of CBI projects sponsored by the Training Technology Field Activity (TTFA) at Fort Knox, KY. Based on the lessons learned from TTFA's experiences, 25 recommendations are made. These recommendations stress careful planning at the different developmental stages, coordinating the work of many people, having all participants co-locate at the instructional site, following the SAT (Systems Approach to Training) method of courseware development, meeting the instructor's needs, and conducting careful evaluations. Actively involving school management personnel in the CBI project is also stressed.

RR 1452 Use of the Multipurpose Arcade Combat Simulator To Sustain Rifle Marksmanship in the Reserve Component, Hagman, J.D.; Moore, H.G.; Eisley, M.E.; Viner, M.P. September 1987. (AD A190 911) This research sought to determine whether MACS training can effectively sustain rifle marksmanship skill, and, if so, identify the amount and schedule of training that produce maximum payoff within the Reserve Component setting. Questionnaire responses revealed that 93% of the soldiers in the experimental groups thought that MACS training would improve their marksmanship performance, 98% enjoyed the training, and 96% would practice with MACS if it were available at their local armory. Although findings suggest that MACS training was ineffective in promoting the sustainment of rifle marksmanship skills, this conclusion must remain only tentative because in most cases the null hypothesis was not rejected. Thus, factors other than the ineffectiveness of the training device must be considered as possible contributors to the lack of statistically significant results. Such factors include inherent weapon variability, small sample sizes, insufficient MACS training, a too-lengthy, no-practice interval between the last MACS practice session and postrecord firing, and the need for an instructor during MACS practice sessions to ensure effective feedback. Future research is suggested to account for the potential contributions of these factors.

RR 1453 Participation in the Army College Fund, Tannen, M.B.; Young, W. October 1987. (AD A190 831) This report provides statistics on participation in the Army College Fund (ACF). Data files of individual records were merged from the Military Enlistment Processing Station accession files, Army Finance and Accounting Center, and Veterans Administration Banking and Benefit records. The resulting data base provided information on ACF enrollment, contribution and refund behavior, and benefit usage.

RR 1454 Leader Development Training Assessment of U.S. Army Training and Doctrine Command (TRADOC) Brigade Commanders, Stewart, S.; Hicks, J.M. October 1987. (AD A190 628) This report documents the conduct and results of the evaluation of a Leader Development Course taught to Training and Doctrine Command (TRADOC) Brigade Commanders. After attending the course, 25 brigade commanders received questionnaires to determine (1) what the contribution of the course to enhancing job proficiency relative to costs was and (2) at what stage(s) of an officer's career should such a self/leader development experience occur. All commanders were subsequently interviewed to determine the rationale used in responding to the questionnaire. Findings of the effort included the following: (1) A leadership development course akin to that provided by the Center for Creative Leadership (CCL) is viewed as being of very positive benefit to the Army; (2) targets for an intense Leader Development experience should be battalion commander designees; (3) the CCL course as now

constituted would not be acceptable for general use in the Army; (4) mentoring as a methodology for developing human resource potential within the Army is not well understood; (5) the most significant mind-broadening experience for senior officers appears to be the Army War College; and (6) communication across field grade and general officer rank boundaries appears to be limited.

RR 1455 76C Transitional Performance Aid: An Examination of Classroom Use, Dressel, J.D. October 1987. (AD A191 330) This research examined (a) the adequacy of a job aid (the Transitional Performance Aid of TPA), (b) the sufficiency of the accompanying training materials, and (c) the reaction of the users, following a preliminary classroom introduction in the Equipment Records and Parts Specialist Course (MOS 76C). The two phase investigation indicated that students have little difficulty using the TPA, voluntarily use it for class work and examination, and desire to use it throughout the course and in the field. As a function of these determinations, the TFA has been implemented into the classroom with the intention of training the students in its application as a job aid.

RR 1456 The Origins of Volunteer Support for Army Family Programs, Bell, D.B.; Iadeluca, R.B. September 1987. (AD A190 587) The purpose of the report is to trace the history of volunteer participation in the Army's family support system within the larger context of volunteer activities in the United States as a whole. The report focuses particularly on the advent of the Army Community Service (ACS) in 1965 and how volunteers support its functions. The report shows that the relationship between the Army and its families has changed considerably over the years. During the Revolutionary War, Army families were essentially federal employees who were paid for their services with government rations. During peacetime, most volunteer support has come from Army wives. During wartime, this effort is augmented by others. The ACS has increased the services to Army families but has been strained lately by the reduction in volunteer hours associated with the large-scale entry of married women into the labor force. The findings are intended for use by Army program managers, policy makers, and family researchers.

RR 1457 U.S. Tank Platoon Training for the 1987 Canadian Army Trophy (CAT) Competition Using a Simulation Networking (SIMNET) System, Kraemer, R.E.; Bessemer, D.W. October 1987. (AD A191 076) Three U.S. Armor companies, nine tank platoons, participated in the 1987 Canadian Army Trophy (CAT) competition. Each tank platoon trained using a Simulation Networking (SIMNET) system in addition to other conventional methods to prepare for CAT. This report presents (a) the conduct and effects of SIMNET training, based on direct observation and interviews; (b) the results of CAT competition for U.S. units; and (c) the potential relationships between CAT results and SIMNET training combined with other unit training. Findings suggest that SIMNET helped unit leaders develop the command, control, and communication (C3) skills to effectively execute those plans during platoon battle runs. Other major contributing factors to CAT outcomes were conducting live fire battle runs and tank crew gunnery training on the M1 Unit Conduct of Fire Trainer (UCOFT). The most apparent shortcoming in the SIMNET system that may have interfered with effective CAT training was in the simulation of the M1 tank's fire control system. Also, drivers had some temporary difficulties in using fine control skills and maneuvering platoon formations.

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RR 1458 Armor Crewmen Assignment Issues and the Use of the Unit Conduct of Fire Trainer (UCOFT) in Performance Prediction, Black, B.A.; Graham, S.E. December 1987. (AD A192 062) This product was developed in response to a request from Seventh Army Training Command and is an aid for military personnel charged with the development and validation of selection and assignment procedures. The report includes a brief review of selection research and methodologies and practical guidelines for avoiding pitfalls during validation research. Variables, aptitudes, and/or skills thought to affect gunner performance are discussed, along with critiques of recent predictor developments. In addition, the report provides basic information on the Unit Conduct of Fire Trainer, the UCOFT's training matrices, and potential applications of the UCOFT in tank gunner performance prediction. A description of UCOFT performance measures and limitations is provided, along with recommendations for the development of a UCOFT training data base as part of a comprehensive USAREUR (U.S. Army Europe) data base.

RR 1459 Feedback Principles for Command Group Training, Garlinger, D.K. December 1987. (A191 860) This report documents a literature review of feedback principles for the purpose of (1) developing guidelines for feedback in command group training, (2) providing empirical support for feedback guidelines, and (3) identifying feedback principles which impose specific requirements for the collection of performance measures. The simplified guidelines for the implementation of feedback in command group training, which are provided in this report, are intended to aid those responsible for planning and executing command group training in identifying feedback variables which will enhance training effectiveness without an unrealistic imposition upon available resources.

RR 1460 Army Vocational Guidance in Two-year Colleges, Faust, D.G.; Warren, I.K.; Hertzbach, A. November 1986. (A191 520) The feasibility of using an automated Army career guidance package to expand the recruiting market was investigated. The package was constructed from JOIN software currently used by Army recruiters and was delivered on JOIN equipment. Feasibility was assessed by career counselors on six campuses. The reactions of students and career counselors were favorable; however, the relatively low number of students (3) who used the system indicates the need for marketing studies before the expense of development and deployment are incurred. This report summarizes the work required for development.

RR 1461 Field Evaluation of a Computer-based Maintenance Training Program for Reserve Component Units, Graham, S.E. December 1987. (AD A193 085) The Model Training Program for Reserve Component Units (MTP-RC) is a computer-based training program designed to train and sustain M1 Tank troubleshooting and maintenance skills in the absence of actual equipment. This research evaluated the effectiveness of the MTP-RC as part of a yearlong trial implementation in three RC units. Participating soldiers were administered hands-on pretests and posttests in which they performed actual troubleshooting procedures on M1 tanks. Combined across four MOS, the performance of 35 soldiers improved from a 36% GO rate on the pretest to an 82% GO rate on the posttest. Paper-and-pencil tests were also administered to compare RC soldier performance to soldiers graduating from resident Advanced Individual Training. The results indicated that the technology-based training concept employed in the MTP-RC is effective for training maintenance skills. Plans are being made to

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convert the MTP-RC to an Electronic Information Delivery System (EIDS)-compatible format and to develop additional training on other weapons system using the validated MTP-RC training concept.

RR 1462 and 1463 Canceled.

RR 1464 The Language Skill Change Project (LSCP): Background, Procedures, and Preliminary Findings, Bush, B.J. December 1987. (AD A193 081) This report documents the scope and objectives of the study that has evolved from the original research concept of documenting the nature and extent of language skill change. It details the data collection procedures over approximately 4 years of a soldier's military service. It also describes the 19 instruments used in the study and the rationale for their administration at various times in a soldier's military career. Also provided is an overview of the statistical research design and preliminary findings that have focused on the attrition rates at the Defense Language Institute (DLI). The project sample is comprised of 1,903 junior Army enlisted personnel who began a basic course of language instruction at the DLI. The language instruction was in German, Korean, Spanish, or Russian. Furthermore, the participants either held or were scheduled for training in one of four Military Intelligence MOS—97B, 97E, 98C, or 98G. Further data collection and analyses are expected to provide recommendations for improved methods of selection, improved resident and nonresident training, and improved unit language maintenance programs. Research procedures are in place for extending the research to other languages and linguists if warranted.

RR 1465 Evaluation of a Job Aid System for Combat Leaders: Rifle Platoon and Squad, Evensen, E.B.; Winn, R.B.; Salter, M.S. February 1988. (AD A193 518) The modern combat leader must make many complex decisions under conditions of great stress. However, while the leader's job has increased in level of difficulty, there are no effective, standardized job performance aids available to help the leader accomplish his job. A need therefore exists to develop and produce a job aid system of Combat Leaders' Guides. A prototype Combat Leaders' Guide: Rifle Platoon and Squad (CLG) was developed and produced using doctrinal materials relating to critical combat common tasks and tasks in skill levels 1-4 in the 11B and 11M Military Occupational Specialties (MOS). The CLG and a feedback form were distributed to over 1,100 active-duty and former active-duty soldiers with over 400 respondents returning their feedback forms. Overall, respondents across all ranks within the Army who used and evaluated the CLG rated it favorably. The results strongly indicate that all respondents found the CLG to be quite useful and effective as a job aid for combat leaders. The evaluations suggest that most personnel who have seen and used the CLG are very much in favor of its production and distribution on an Army-wide basis. The findings from the evaluation further suggest that the CLG is presently, and will continue to be in the future, a viable and effective asset to combat leaders. Furthermore, the CLG is also anticipated to be an important tool for soldiers to use when engaged in, and preparing for, combat missions through training and combat proficiency drills.

RR 1466 National Training Center Performance Trends for the Maneuver Operating System: Relationship to Training Doctrine, Johnson, C.A.; Williams, R.K., Jr. April 1988. (AD A195 472) A detailed analysis of 26 Take Home Packages was conducted to

assess the feasibility of determining specific training needs and to link needs directly to Army Training and Evaluation Program (ARTEP) tasks. Performance Trends for the Maneuver Operating System showed consistent strengths and weaknesses in unit performance. The lack of standardization in topics commented on was identified as a problem. The Operating System structure made translation to an ARTEP structure difficult. Recommendations were made for restructuring the Take Home Package and for standardizing observations.

RR 1467 A Survey Comparing the M2/3 Bradley Fighting Vehicle and the M113 Armored Personnel Carrier by Members of the NTC Operations Group and OPFOR, Hamza, A.N. March 1988. (AD A193 800) A questionnaire was given to the National Training Center (NTC) Observer/Controllers (O/C) and Opposing Force (OPFOR) to obtain their observations and opinions on the effectiveness of the M2/3 Bradley Fighting Vehicle in comparison to the M113 Armored Personnel Carrier. Results indicate respondents strongly favored the M2/3 when compared to the M113, and regarded the capability of the M2/3 as being essential to success on major battlefield tasks.

RR 1468 National Training Center Performance Trends for Mortar Fire Support: Relationship to Training Doctrine, Hamza, A.N.; Williams, R.K., Jr. April 1988. (AD A194 322) This report describes a methodological approach developed for the analysis of mortar performance trend data contained in the Fire Support Operating System section of Take Home Packages (THPs) from the National Training Center (NTC). The purpose of the analysis was to determine the efficacy and practicality of the methodology as a feedback mechanism. The methodology categorized the performance trend data so that unit strengths and deficiencies could be identified, and then these findings were linked to relevant Army Training and Evaluation Program (ARTEP) tasks to assist training managers develop optimal training programs. A parallel study using a larger operating system was discussed.

RR 1469 South Atlantic Conflict of 1982: A Case Study in Cohesion, Stewart, N.K. April 1988. (AD A193 790) This research uses the South Atlantic conflict as a case study of land forces and an analysis of the issues of cohesion, bonding, and combat effectiveness. Based on a review of the literature and pertinent research on cohesion and combat effectiveness, the author derived a short scale that measures cohesion variables affecting combat effectiveness. This 24-item scale consists of four major categories: Societal Factors, Organizational Bonding, Vertical Bonding, and Horizontal (Peer) Bonding. Based on extensive fieldwork interviews with enlisted personnel and officers of the British forces and the Argentine Army, the author uses the model as a framework for analyzing this conflict in relation to combat effectiveness. The author found that cohesive units had more success on the battlefield and endured deprivations of climate and supply better than noncohesive units. Cohesion affects all aspects of combat effectiveness and is indeed a "force-multiplier." Implications of the 1982 South Atlantic Conflict for U.S. manpower planners are discussed.

RR 1470 Model Training Program for Reserve Component Units: Final Report, Begg, J. March 1988. (AD A197 304) Addition of new, sophisticated systems to the Army inventory presents special training problems to Reserve Component (RC) maintenance units. Upon mobilization, these units support active units using the new systems, but the RC soldiers have limited training time and little or no access to the new equipment or knowledgeable

instructors. The Model Training Program for Reserrve Component units investigated the use of computer-based training (CBT) with interactive videodisc to deliver training to RC units. CBT courses were developed for four Military Occupational Specialties responsible for the M1 Abrams tank. The training was fielded for trials for 1 year at three RC units, and effectiveness of the training was evaluated with hands-on and written pre- and posttests. In addition, a survey of over 200 developers of CBT was conducted to investigate the problems of CBT development projects. Recommendations were made for analyzing and procuring CBT projects, estimating costs, enhancing production techniques, and fielding the computer-based training at Reserve units.

RR 1471 Army Maintenance Training and Evaluation Simulation System (AMTESS): Lessons Learned, Kessler, J.J.; Macpherson, D.H.; Mirabella, A. April 1988. (AD A193 148) Lessons Learned from the Army Maintenance Training and Evaluation Simulation System (AMTESS) program about how to design and acquire maintenance training devices were incorporated into a Device Acquisition Guideline (DAG). The DAG was applied to representative device specifications to determine the quality of current spec writing and to recommend improvements. It was concluded that much could be done to improve specs by organizing them more clearly, defining terms more explicitly, and highlighting and better defining specs that had proven to be problems in past acquisitions. It was further concluded that job aids should be developed to help the spec writer, since that job demands the skills of a technical writer, human factors specialist, and instructional designer, as well as those of an engineer.

RR 1472 Factors Affecting Retention in Military Intelligence MOS 98G and 33T: Summary of Existing Data, Kimmel, M.J.; Knapp, B.G.; Carter, F.L. April 1988. (AD A193 149) In response to a request from the Director of Military Personnel Management (DMPM), existing information on retention problems in two Military Intelligence Occupational Specialties (MOS) was compiled: 98G (Signal Intelligence Voice Intercept) and 33T (Tactical Intelligence Systems Repair). The information consisted of reenlistment/attrition rates, subject matter expert opinions, and attitude survey results. Although existing data are sparse, they suggest that MOS 98G/33T attrition may be a greater problem for midcareerists and careerists than for first termers and may be related more to job satisfaction and promotion potential than to monetary incentives.

RR 1473 The Message Content of Advertisements for Active Army Enlistments, Baxter, S.; Gay, N.L. May 1988. (AD A196 841) This report describes the message content analysis undertaken as part of the Army Communications Objectives Measurement System (ACOMS) project. The results are based on a sample of 3,665 male and female 16- to 24-year-olds who viewed 13 video and 11 print active Army advertisements. The analysis of the data indicates that unaided recall of Army sponsorship is made by a high percentage of respondents when video and print ads are initially displayed in the midst of other advertisements. The message attributes rated most highly by the video-advertisment viewers concerned high-technology equipment, an experience to be proud of, and an opportunity to develop one's potential. Print-advertisement respondents perceived messages dealing with money for education, skill training, and experience to be proud of. Statistically significant differences were found between the genders and among ethnic groups for many of the Army attributes perceived

in the advertisements. Generally, males and whites perceived the attributes more frequently than females and blacks, respectively. Analysis of main messages confirms that the attributes capture the vast majority of messages conveyed, although an attribute focusing on adventure and excitement could be added.

Other ACOMS-related reports are identified as follows:

Technical Reports 785, 786, and 787

Research Products 88-04, 88-05, 88-06, 88-07, and 88-08

Research Notes 88-17 and 88-18

RR 1474 Establishing Priorities for Civilian Personnel Management Research in the Army, Clark, S.B.; Savell, J.M.; Sweeney, D.H. April 1988. (AD A197 397) Based on the findings of the <u>Army Strategic Plan for Civilian Personnel Management Research: A Roadmap for the Future</u>, a questionnaire containing 16 broad areas for possible research was designed. The purpose of this effort was to assign priorities to research topics aimed at improving the management of the Army's civilian personnel. This questionnaire was distributed to key individuals throughout the Army. These persons were drawn from all major commands and represented military and civilian employees, personnelists and managers, those with staff assignments and those in the field, and those who participated in the previous <u>Roadmap</u> study as well as those who did not. The survey participants were asked to rate each of the areas on three dimensions: (a) the value of improving things in the area, (b) the seriousness of the consequences of not improving things, and (c) the likelihood that additional information would be used. The overall top priority topics were related to recruitment, retention, and the identification and development of supervisors and managers. The lowest priority topics were related to mobilization issues, manpower forecasting, and organizational effectiveness.

RR 1475 A Comparison of Survey Length With Reading Difficulty Level and Selected Recruit Characteristics for the 1987 USAREC Survey of Active Army Recruits, Benedict, M.E. May 1988. (AD A195 620) This report presents the results of analyses of test length and readability conducted on the 1987 USAREC New Recruit Survey active Army survey instrument. The report contains comparisons of test length with Test Category and other recruit demographic characteristics. Recommendations are made for the development of survey questionnaires.

RR 1476 Canceled.

RR 1477 User Acceptance and Field Implementation of Decision Support Systems, Riedel, S.L. May 1988. (AD A200 412) This report documents the results of an invitational workshop on User Acceptance and Implementation of Military Decision Support Systems that was held at Fort Leavenworth on 28-29 January 1987. It was sponsored by the U.S. Army Research Institute, the Joint Services Working Group on Decision Aiding, and the U.S. Army Combined Arms Combat Developments Activity at Fort Leavenworth. Participants included fourteen representatives from the military, government and from government contractors. The objectives of the Workshop were: (1) to identify a list of user acceptance problems and develop strategies for addressing each of these problems; (2) to discuss problems associated with involving users in aid design and evaluation; and (3) to make recommendations for

addressing these user involvement problems. The report lists twenty-two user acceptance problems that were identified during the Workshop and discusses the recommendations made by workshop participants. Participants concluded that most of the recommendations which were made could best be accomplished through careful organizational management of the design and implementation of the system. Other general recommendations included early and ongoing user involvement in aid design and evaluation, identification of the appropriate user for design and evaluation, common interface across aids and systems, training and education, an evolutionary development cycle, and organizational mechanisms for formally linking the user and builder. Suggestions were made for other organizational mechanisms that would facilitate user acceptance.

RR 1478 Making Decisions About Civilian Personnel Management Research in the Army: Part 2 of the Army Road Map, Clark, S.B.; Savell, J.M. April 1988. (AD A197 305) The objective of this effort was to provide decision makers and researchers with an information-based tool for assessing the general nature and magnitude of research efforts necessary for making long-term improvements in the management of Army civilian personnel. It is part of a follow-up activity to an earlier study that identified potential topics for research in this area. This report's companion document, Establishing Priorities for Civilian Personnel study. The information in this docuent relates to considerations affecting the decisions of whether (and when) to initiate a given research effort, and includes such factors as the following: (a) the interrelationships among research activities, (b) the preliminary research required before particular research questions can be addressed, (c) the approximate personnel and time needed to complete research tasks, and (d) the efficiencies to be gained by consolidating research activities that are methodologically or conceptually linked.

RR 1479 The Evaluability Assessment of the Recruiter Training Program, Hull, G.L.; Benedict, M.E. June 1988. (AD A197 782) This report presents the results of an Evaluability Assessment (Planning Evaluation) for the U.S. Army Recruiting Command (USAREC) Recruiter Training Program. The report contains a brief history of the Army recruiting course and provides the evaluation plan for the full process and outcome evaluations of the program.

RR 1480 Exploratory Examination of Procedures for Improving Lieutenant Leadership Development, Smith, N.D. April 1988. (AD A198 617) This exploratory research set out to examine the utility of a lieutenant peer evaluation procedure commanders could use to formulate a leadership plan for the lieutentants with the objective of increasing feedback. Concurrently, practices and procedures in use in the company were examined to determine how lieutenant leader development was undertaken and to determine how peer evaluations could be integrated into the current system.
Two combat arms battalions and 1 combat support battalion provided officers. A total of 2 battalion commanders, 1 executive officer, 7 company commanders, and 19 lieutenants participated. The research was composed of four phases extending over a period of 6 months. In Phase I, lieutenant peer evaluations were written and lieutenants completed self-rating forms. In Phase II, commanders evaluated lieutenants on a rating form similar to the one used by lieutenants. In Phase III, a lieutenant leader development plan was to be written based on the peer evaluation information. In addition, examination of current practices in use in the

participating companies was begun. In Phase IV, reevaluation by commanders of lieutenants and by lieutenants of themselves took place. The major conclusions drawn from this research include the following:

- Peer evaluations in TOE (table of organization and equipment) units measured by the peer evaluation instrument employed in this research were not effective in achieving the quality of responses to develop a lieutenant leadership development plan.
- The Officer Evaluation Report Support Form (DA Form 67-8-1) or "-1" is an effective procedure available to commanders. However, the potential value of the "-1" as a performance and developmental tool is not being exploited. This is not a result of lack of interest by company commanders but a lack of training in the use of the form. Modifications in the form itself and a training program that teaches commanders and subordinates how to specify behavioral objectives using the "-1" are both required to improve lieutenant leader development.
- The utility of the 14-item Rating Form used in this research (or a similar evaluation instrument) by commanders and lieutenants for periodic clarification of performance expectations in conjunction with the OER Support Form should be further examined.

RR 1481 Job Analysis of U.S. Army Civilian First-Line Supervisors, Rosenthal, D.B.; Riegelhaupt, B.J.; Ziemak, J.P. May 1988. (AD A199 077) The objective of this project was to obtain job analysis information on Army civilian first-line supervisors. Preliminary lists of supervisory job tasks and knowledges, skills, abilities, and other characteristics (KSAOs) were developed and revised by 427 job incumbents in a series of workshops at 18 Army installations. The final lists were incorporated into a survey mailed to 4,400 Army civilian first-line supervisors in both U.S. and overseas locations. Respondents' answers to background questions indicated that openings for first-line supervisors are generally filled at the local level and typically go to a member of the work group. The supervisory tasks performed most are those directly related to the work being carried out by the supervisor's subordinates. Knowledges utilized across all first-line supervisors (e.g., Knowledge of the Performance Appraisal Process) are what supervisors needed to know the most about. Knowledges utilized only by a subset of supervisors (e.g., Policies for Supervising Local Nationals) are needed the least. A long list of skills, abilities, and other characteristics were found to be important to successful supervisory performance. Eight general dimensions underlie this list: the supervisor's character, interpersonal skills, drive, communication skills, general management skills, leadership ability, competence, and ability to handle stress. It was recommended that knowledges not be used as selection criteria because respondents indicated that knowledges were typically acquired within the first 12 months on the job, and it would be inappropriate to screen candidates for possession of knowledges that they would learn soon after they started work. Since the data largely failed to uncover meaningful types of first-line supervisors, it may be possible to use a single set of skills, abilities, and other characteristics for all supervisors. It is recommended that a group of subject matter experts be convened to establish linkages between the important skills, abilities, and other defensibility of selection procedures developed from this job analysis.

RR 1482 With the Mountain Men: Co-operation and Competition Within the Context of Cohort, Malone, D.M. May 1988. (AD A200 100) This paper describes a series of field visits with COHORT small units (squad to battalion), by a military analyst, during the

period June 1984 through February 1988. The purpose of this "natural state" research was to develop recommendations for (1) increasing the degree of cohesion both within and between Army units; and (2) applying the effects of this increased cohesion to better teamwork on the battlefield. Some 60 group interviews were conducted with approximately 300 COHORT small unit leaders and were directed to the dynamics of teamwork (e.g., cooperation and competition, coordination, and communications) at times when the leaders felt their squads, platoons, or companies were operating "at their best" in field or garrison situations. From these small unit "anchor points of excellence" were developed observations, implications, opportunities, and applications that provide a basis for policy recommendations, as well as for actions that can be taken at all levels to systematically or directly enhance collective performance within and between Army units.

RR 1483 Accuracy of Boresight Equipment for the 25-Millimeter Gun of the Bradley Fighting Vehicle, Perkins, M.S.; Wilkinson, C.S. May 1988. (AD A199 025) Observations of zeroing with the 25-mm gun of the Bradley Fighting Vehicle (BFV) indicated excessive ammunition expenditure. Analysis of fielded boresight equipment indicated that 25-mm boresight adapters were generally less accurate than boresight telescopes; however, some telescopes were extremely inaccurate. Data indicated that telescope accuracy decreases with equipment use and abuse. Much inaccurate equipment was not designated for repair or replacement; lack of fielded accuracy standards for either the 25-mm adapter or the 25-mm kit may contribute to this undesirable situation.

RR 1484 Targeting the Delivery of Army Advertisements on Television, Elig, T.W. July 1988. (AD A199 495) The U.S. Army uses advertisements to affect the knowledge, attitudes, and behavioral intentions of youth to effectively recruit manpower. Both the message content and the delivery of the message are targeted to recruit soldiers who are most likely to provide effective national defense. This report addresses the targeting of message delivery to priority groups for enlistment through placement of advertisements on television. As part of 30-minute computer-assisted telephone interviews conducted for the Army Communications Objectives Measurement System (ACOMS) between July and December 1987, half of all respondents were asked a series of questions about media habits. The analyses reported in this paper are based on the responses of 1,847 males, 16- to 21-years old. Comparisons are also made to an overlapping sample of 1,676 males, 18- to 24-years old.

Several television programs and program types have significantly different proportions of Army prime market groups in their audiences. This information can be used to improve the efficiency with which the Army targets advertisements. Similarly, the quantification of audiences by race/ethnic groups and the quantification of priority groups within race/ethnic groups can contribute to the selection of programs for the Army's minority recruitment advertising efforts.

RR 1485 Evaluation of Recruiter Performance Measures and Policy, Weiss, H.M. July 1988. (AD A201 344) Effective selection of recruiters is essential to the success of recruitment. To meet this objective, the Recruiter Selection Battery-Experimental (RSB-X) was developed. The RSB-X was administered to over 400 recruiters who entered the Army Recruiting Course during May and June 1985. This report documents the results of the first stages of an attempt to examine the ability of the RSB-X and other characteristics to predict

recruiter success. On the basis of interviews with key U.S. Army Recruiting Command personnel and examination of performance records for the sample of recruiters, a definition of recruiter success was developed, multiple measures of recruiter performance documented, and data element of the RSB-X described. These preliminary activities indicate that an assessment of the ability of the RSB-X and other characteristics gathered at the same time to predict recruiter success can proceed efficiently.

RR 1486 ARI Research in Basic Skills Education: An Overview, Simutis, Z.M.; Ward, J.S.; Harman, J.; Farr, B.J.; Kern, R.P. July 1988. (AD A201 402) The Army provides basic academic and English language instruction to enlisted soldiers to enhance their proficiency in military duties. Since 1980, ARI has conducted major research and development to (1) evaluate Army basic skills programs; (2) apply adult basic skills methodology to Army education, (3) disseminate education research findings, and (4) explore the value of technology in Army education. These efforts have had a major impact on Army education, and some products are being considered for application to nonmilitary vocational and education programs.

RR 1487 Review of Reserve Componennt Training: Problems and Solutions, Eisley, M.E.; Viner, M.P. July 1988. (AD A199 444) This literature review was conducted to help establish a ground for future research and development to improve Reserve Component (RC) training. Using computer searches and bibliographies obtained from various information services, documents published over the last 10 years were selected. The literature shows that the RC faces training challenges quite distinct from those found in the Active Component (AC). The most prominent challenges are severely limited time for training, the geographical dispersion of units, and the reassignment inflexability of parttime soldiers. The literature revealed deficiencies in five major areas: soldier availability, prerequisite aptitudes and skills, learning motivation, time to conduct training, and training resources at the local unit level. Numerous suggestions and solutions to improve RC training are proposed in the literature and summarized in this report.

RR 1488 Development and Evaluation of the Multipurpose Arcade Combat Simulator: A Research Summary [MACS], Evans, K.L. September 1988. (AD B130 099) Patented in 1986, the Multipurpose Arcade Combat Simulator (MACS) is a part-task weapons trainer developed in 1982 with mostly off-the-shelf components. Although it was designed to provide inexpensive training with a variety of weapon systems, current interest is focused largely on its use as a rifle marksmanship trainer. This research report summarizes the results of over 20 developmental hardware tests, training and cost effectiveness evaluations, and informal field investigations conducted since 1982. Major research trends from this body of MACS research are identified. In summary, the benefits associated with MACS training used in conjunction with standard training appear to be increased performance, fewer failures to meet performance standards, significantly lower expenditures of ammunition, improved performance feedback, and greater soldier interest.

RR 1489 M1 Tank Degraded Mode Gunnery: Research Results and their Training Implications, Witmer, B.G. September 1988. (AD B129 468) Limited testing of experienced gunners under degraded mode conditions on the M1 Tank Unit Conduct of Fire

Trainer (UCOFT) showed decrements in degraded mode gunnery performance. The size of these decrements varied according to type of fire control system failure, tank movement, target movement, and target range. The implications of these findings for training and sustaining degraded mode gunnery skills were the focus of careful analysis. The analysis showed that degraded mode gunnery training must include training in recognition of failures in primary fire control systems and in the effective use of alternate fire control system components and procedures. Degraded mode training should place special emphasis on engaging long-range, moving targets and applying correct manual lead based on target speed. While new training strategies may improve degraded mode gunnery performance, the design of backup fire control components such as the Gunner's Auxiliary Sight (GAS) may limit what training can reasonably expect to accomplish. Equipment redesign may be required.

RR 1490 Families and Readiness: An Examination of the 1985 DoD Survey of Enlisted Personnel, Pliske, R.M. August 1988. (AD A203 166) The existing literature on military families and readiness was reviewed, along with related literature from civilian population studies. Data from 1985 DOD Survey of Enlisted Personnel were matched to Army records containing Skill Qualification Test (SQT) scores used to measure job performance. The results suggest that dependent care arrangements are a problem for a substantial minority of Army personnel in both short- and long-term situations (no-notice alerts and unit deployments). Although dependent care problems are of particular concern to single and dual military parents, parents married to civilian spouses also have dependent care problems. Analyses of SQT scores indicate that marital status is not significantly related to job performance; however, the presence of one or more children has a small positive relationship to job performance. Recommendations for future research are discussed.

RR 1491 The Development and Implementation of Basic, Advanced, and Unit M16A1 Rifle Marksmanship Training Programs, Evans, K.L.; Osborne, A.D. August 1988. (AD A204 659) This report summarizes the research on M16A1 rifle marksmanship training conducted by the Army Research Institute (ARI) at Fort Benning primarily between March 1978 and January 1983. It examines research designed to identify marksmanship training problems and to evaluate promising solutions to these problems. The overall marksmanship research led to the development and implementation of an integrated set of three training programs: basic, advanced, and unit rifle marksmanship. These programs have been approved for adoption Army-wide by the U.S. Army Infantry School (USAIS) (as proponent). Implementation efforts are documented in the areas of equipment research, target design, range modification, training aids and devices, and instructor training. The report also summarizes the major problems that must be resolved for fully effective marksmanship training. It concludes with information about current or planned research directed toward improved marksmanship instruction.

RR 1492 Army Aviation Ammunition and Gunnery Survey. Volume I: Executive Summary, McAnulty, D.M.; DeRoush, D.J. August 1988. (AD A204 879) The research was conducted to compile an empirical data base on the current training in active U.S. Army (AA) and National Guard (NG) attack helicopter units and to estimate the resource requirements for qualifying and sustaining adequate levels of aviator gunnery proficiency. Separate versions of the Ammunition and Gunnery Survey were distributed to a sample of AA

and NG aviators (Form A) and unit commanders (Form B). The aviators returned 810 (41% return rate) usable Form A surveys. The unit commanders returned 127 (35% return rate) usable Form B surveys. This report presents a summary of the major results of the survey data. The primary conclusions are (a) a substantial number of attack helicopter units are unable to meet training standards with the resources currently available to them, (b) gunnery ranges have inadequate scoring methods or are not readily available to many units, (c) flight simulators are being used only moderately by AA aviators for gunnery training, and (d) the current ammunition authorization approximates the minimum number of rounds needed to qualify and sustain the average aviator's gunnery skills. The limitations of the survey data and the need for experimental studies of training effectiveness are also discussed.

RR 1493 Alternative Environments for Army Recruiting, 1987-2001. Volumes 1-3, Boucher, W.I.; Morrison, J.L. January 1988. (V. 1—AD A204 624; v. 2—AD A204 727; v. 3—AD A204 728) This three-volume report illustrates the application of the concepts and techniques of futures research to national security planning. Its focus is on the outlook for Army recruiting over the next 15 years, given the various ways that the external social, technological, economic, political, and military environment may evolve in this period, nationally and internationally. In Volume 1, four scenarios are presented that incorporate hundreds of original forecasts derived through use of an advanced version of the Delphi method. Three of the scenarios represent alternatives to the "most likely" future, which is presented in detail. The results provide a unique foundation for identifying and evaluating policy options for Army recruiting, and guidelines for such apolicy analysis are included, along with extensive discussion of the rational for this approach to planning. Volume 2 contains the appendixes.

RR 1494 Canceled.

RR 1495 Academic Skills of U.S. Army Non-Commissioned Officers, Harman, J.; Bell, S.A.; Sneed, D.C.; Sabol, M.A. September 1988. (AD A203 167) At the request of the Commander, Training and Doctrine Command, ARI researchers administered tests to soldiers attending NCO Academies at TRADOC sites in order to determine their academic skill levels. On the average, these soldiers read at the 11.0 grade level and perform at the 9.9 grade level in mathematics. These findings will become part of ARI's research program concerning academic skills of NCOs and can be used by the TRADOC Commander to make decisions about basic skills training programs for NCOs.

RR 1496 From Semantics of Procedures to Instructional Design: Project Review, Kostyla, S.J. September 1988. (AD A204 466) In 1984, the U.S. Army Research Institute (ARI) initiated a 3-year project to study, design, and develop instructional environments to enhance procedural troubleshooting skills for maintaining complex machines. The goal of the project was to identify artificial intessligence technologies that could be used to increase the technical proficiency of maintenance personnel. Initially the effort focused on the role of conceptual and procedural knowledge in troubleshooting and the ways in which procedural skills can be learned as meaningful structures. Various types of computational tools were used to extract, analyze, and represent the structure of diagnostic procedures, field trouble-shooting expertise, and the nature of mental models of complex machines and their role in causal reasoning. Simulation and qualitative modelling studies were conducted to

determine the role of mentel modelling in instruction and to investigate how simulation of machine behavior and repair strategies can provide maintenance personnel with a means for understanding machine components, functions, and troubleshooting procedures. The investigation of instructional strategies for teaching diagnostic skills led to the development of an interactive design and development system, Instructional Design Environment (IDE). IDE is a prototype interactive design and development system that assists instructional designers with the process of creating complex instruction. IDE is essentially a knowledge structuring system where the knowledge is course content, structure, and instructional method. IDE accepts knowledge describing course goals as input, and assists the designer in creating a course as output. The system implements a way of articulating the design and development process by fostering the creation of a structure that explains why curriculum design and delivery decisions were made. IDE can help create course design, structure course content, and create instructional sequences for standard as well as adaptive delivery.

RR 1497 The Effects of Small Group and Individual Computer-Based Instruction on Retention and on Training Lower Ability Soldiers, Shlechter, T.M. September 1988. (AD A203 793) The effects of having various numbers of soldiers at a terminal for computer-based instruction (CBI) in a procedural task were examined. Soldiers in each of two experiments were trained to use the Communications-Electronics Operating Instructions (CEOI) extracts,. Twenty-four soldiers participated in Experiment 1. Eight were nonsystematically assigned to each of three conditions: "GRP," or four at a terminal; "PR," or two at a terminal; and "IND," or one at a terminal. All soldiers took a pretest, a posttest immediately after training, and a second posttest 2 weeks later. Thirty-four soldiers, who were in sustainment training, participated in Experiment 2. Twelve were in the GRP condition, 10 in PR, and 12 in IND. All were pretested and took three posttests: one immediately after training, another 2 weeks later, and another 8 weeks after training. The results of the two experiments suggested that, for both low-ability and other soldiers, the GRP and PR presentations were more cost-effective. Further, soldiers in GRP and PR conditions retained more information than those in IND conditions.

RR 1498 Measuring and Assessing Technical Training Performance in the Army's Schools and Units: A Survey of Current Methods, MacDiarmid, W.R.; Andrews, D.H.; Mohs, B. October 1988. (AD A214 731) The objective of this project was to survey some methods in use in the Army's institutions and units to measure individual and collective training performance and determine how the resulting data are used. Six Military Occupational Specialties (MOS) were selected to provide a sample for the survey. Onsite surveys were conducted at the two service schools involved in training soldiers with those six MOS and at units of III Corps to which those soldiers were assigned. In addition to structured interviews, questionnaires were provided to key decisionmakers (KDB) in the schools to determine their data needs and whether they think those needs are being met. The Army generally develops its institutional training to be responsive to the needs of the units in the field. While there are anomalies in the system, what is trained in the school is, for the most part, what the soldier must do on the job. The performance of the individual soldiers and units is measured routinely and the results of that measurement are used to identify further training requirements. However, the performance is generally measured on a qualitative basis and is process not product oriented. For most part, the resulting data are not used to the fullest extent possible.

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Moreover, there appears to be a lack of commonality of terms, due in part to the many documents confronting the member of the training community and the imprecision of the definition of various training-related terms in those documents.

RR 1499 Perspectives on Reserve Attrition, Nogami, G.Y.; Horne, D.K. October 1988. (AD A206 333) This paper reports and analyzes rsults of the <u>ARI Survey of Army National Guard/Army Reserve</u>. Supervisors and peers of attritees were asked to list 36 reasons for leaving the Reserves. Their responses provide information that may be useful in understanding the high turnover rates of Reserve personnel. However, we hypothesize that the survey items may reflect a smaller number of unobserved factors that include conflicts with civilian job or school, lack of leisure time, conflict with family responsibilities, dissatisfaction with Reserve duties, low pay and lack of promotion potential, and health problems. Factor analysis is used to test the factor structure hypothesis. Peer and supervisor responses are compared to identify differences in frequencies and in the factor structure. Because peers and supervisors were asked to rate separation motives for the same attritees, differences in responses between the two groups should be a function of variations in perceptions.

RR 1500 Four Years of Media Habits: Implication for U.S. Army Advertising to the Prime Market, Asbury, J.E. October 1988. (AD A207 560) This report covers 4 years of data from the New Recruit Survey that focuses on recruits' media habits. Media items are analyzed by entry test score categories, sex, ethnicity, region, age, and level of education at contracting, with emphasis on identifying the media habits of prime or quality recruits.

RR 1501 SINCGARS Operator Performance Decay, Palmer, R.L.; Buckalew, L.W. November 1988. (AD A210 716) The Single-Channel Ground/Airborne Radio System (SINCGARS) is scheduled to replace the Army's VRC-12 and PRC-77 radios. However, SINCGARS is more complex to operate and requires more training. This study examined the decay of operational skills and knowledge in two groups of recently trained operators who went without exposure to SINCGARS for several weeks. Performance levels were measured with the SINCGARS Learning-Retention Test (SLRT), a simulated hands-on performance test emphasizing skills and operational knowledge retention. The results provided tentative indications that operators may lose about 10 percent of their prior performance levels within the first few weeks. This figure is expected to vary considerably, depending on the type of soldier, the length of the nonexposure period, and other conditions. It was also found that performance level was correlated with soldiers' Armed Services Vocational Aptitude Battery (ASVAB) General Technical (GT) scores. Correlations between GT and SLRT scores obtained at two different times were .43 and .50, respectively. However, no relation was observed between performance decay and GT. Further evaluation of operator performance decay needs to be done to determine the effect of longer periods of nonexposure (e.g., 60 and 90 days).

RR 1502 Impact of Excellence in Armor Program on Soldier Performance in OSUT, Mendel, R.M.; Erffmeyher, E.S. December 1988. (AD A207 512) Promising Armor soldiers are enrolled in the Excellence in Armor training program (ET). This program is designed to accelerate a soldier's progression to tank commander by fostering early development of gunnery and related skills. The objectives of this research were to (1) determine if ET soldiers develop knowledge and skills beyond those of their normal track (NT) cohorts,

particularly in the area of gunnery under both normal and degraded tank fire control system modes, (2) evaluate the degree of similarity between ET soldiers' and tank commanders' aptitude, interest, and temperament profiles, and (3) examine the validity of selected Armed Forces Vocational Aptitude Battery (ASVAB) and Project Alpha Predictor Battery (PAPB) scales for forecasting performance during one station unit training (OSUT). Performance measures were developed to reflect the areas emphasized by the ET program of instruction (POI), the NT POI, and aspects common to both POIs. These measures were administered to 83 ET soldiers and 83 NT soldiers matched on cognitive and psychomotor abilities. ASVAB and Project A predictor battery (PAPB) performance data were gathered for these soldiers and 41 Noncommissioned Officers (NCOs). ET soldiers demonstrated performance gains over NT soldiers on measures targeting both the ET POI and the NT POI. On computerized armor training-device-based measures of gunnery performance, ET soldiers were more accurate and made fewer system management errors than did NT soldiers. These differences were traced to better performance on degraded exercises. Analyses of the relative similarity of ET, NT, and NCO ASVAB/PAPB profiles indicated that NT soldier profiles are more similar to NCO profiles than are ET profiles. One station unit training (OSUT) performance was predicted quite well by a combination of measures from the ASVAB and the PAPB.

RR 1503 Evaluation of the U.S. Army Recruiting Command Recruiter Training Program, Hull, G.L.; Kleinman, K.; Allen, G.; Benedict, M.E. December 1988. (AD A206 844) This research included both a process evaluation and an outcomes evaluation of the Army REcruiter Course (ARC). The process evaluation examined seven elements of the ARC: (1) Recruiter Candidates, (2) Course Content, (3) Instructional Strategies, (4) Media and Materials, (5) Instructors, (6) Instructional Environment, and (7) Student Evaluation Procedures. The outcome evaluation examined the attitudes that students and instructors held toward the ARC. Student achievement data and attitudes toward the course were collected through observations, interviews, and questionnaires. Data were also collected from instructors. Corrleational analyses and multivariate tests, along with other procedures, were used to examine the data. The course is regarded positively by both students (past and present) and instructors. Negative correlations between course evaluations and test performance were found, with the exception of performance in the Recruiter Exercise. Generally, the data indicated that the better the student, the more negative the evaluation. In summary, the ARC is effective and is meeting its primary goal.

RR 1504 Target Acquisition and Analysis Training System: Effects of Motion on Performance in the CVI Training Program, Smith, N.D.; Heuckeroth, O.H.; Shope, G.L.; Warnick, W.L.; Essig, S.S. December 1988. (AD A207 010) The purpose of this research was to determine (1) whether introducing motion into the Basic Combat Vehicle Identification (CVI) Training Program produces improved performance following initial and repeated training; (2) whether motion facilitates learning by soldiers who were not training responsive (NTR) in acquiring recognition and identification (R&T) skills, compared to soldiers who were training responsive (TR); and (3) whether motion helps soldiers retain recognition and identification materials over an 18-hour period. Soldiers from the 1st and 3rd Brigades of the 85th Army Reserve Division (Tng) [One Station Unit Training], Arlington Heights, Illinois, received R&I training. Each soldier received three training sessions with three modules from

the CVI program with <u>one</u> of four types of motion: (1) rotational, (2) circular, (3) straightline, and (4) static (no motion). Useable data were obtained from 71 soldiers.

Major conclusions drawn from analyses of these data include the following:

- Motion (after repeated training) provides a small positive effect but does not appear to be an essential ingredient in learning ground-to-ground vehicle R&I using the Basic CVI Training Program. This is true for both training responsive and nontraining responsive soldiers.
- Short term retention of learned R&I skills is not improved when motion is included in the training.

RR 1505 Training Technology for the Operational Level of War, Lucas, K.W.; Harris, P.; Stewart, S. June 1988. (AD A213 219) This report is the application of standards of performance concept of training for the Army's senior leadership at the operational level of war. Technology is the key to training, considering the environment and funding constraints on large-scale maneuver exercises. AirLand Battle Doctrine should be the basis for the training of today's senior leaders and for the development of future leaders. The key tenet of AirLand Doctrine, synchonization, appears to be a construct that can be developed as a standard of performance measurement using current state-of-the-art technology. In addition, successful application of the synchonization concept at the operational level of war appears to require the majority of the critical skills essential to executive level leadership.

RR 1506 Lessons Learned from a Front-End Analysis Effort: The Case of Pedestal-Mounted Stinger (PMS), Stewart, J.E. December 1988. (AD A207 309) A front-end analysis (FEA) technique called MIST (Man-Integrated Systems Technology) was used to estimate maintenance manpower and personnel requirements for the Pedestal-Mounted Stinger (PMS) air defense system. The emphasis of this report is on the lessons learned by the MIST team from this effort, including pitfalls of which all FEA practitioners should be aware, and potential solutions to these problems.

RR 1507 Industrial Simulation Games for Executive Development: Review of the Literature and Implications for Military Applications, Baker, J.D.; Harris, P.A.; Lucas, K.W. December 1988. (AD A209 953) A literature survey was conducted to assess the use of simulations for executive development in the industrial sector and to identify potentially useful applications for the development of the future leaders of the U.S. Army. Eighty-four relevant citations were sorted into categories, analyzed, and described in terms of approach, design, intended audience, and reported outcomes. While simulation training is widely used and growing in popularity, the focus of the training is generally on lower to midlevel managers. No specific data were found to confirm the learning value of simulation-based training. While no "off-the-shelf" simulations for Army executive development were identified, the survey did reveal design principles, modeling approaches, and training concepts for further analysis and research.

RR 1508 Canceled.

RR 1509 Evaluation of the Hand-Held Mathematics Tutor, Harman, J.; Bell, S.A.; Laughy, N. February 1989 (AD A207 157) This report describes the evaluation of

the Hand-Held, Computerized Mathematics Tutor that was developed to teach job-related mathematics to Combat Engineers. Twenty-seven Combat Engineers stationed at Fort Sill, Oklahoma, participated in the research. Pre- and post-tests of their mathematics skills were administered, as well as a questionnaire to determine their attitudes toward the tutor. Analysis revealed that the tutor improved soldiers' mathematics skills, with the magnitude of the improvements corresponding to the number of hours spent using the tutor. Participants liked the tutor, found it easy to use, and preferred it to mathematics instruction by textbook.

RR 1510 Assessing the Impact of Psychomotor and Leadership Selection Tests on the Excellence in Armor Program, Graham, S.E. March 1989 (AD A207 ~~593~~) As part of the Skills Selection and Sustainment (S^3) program, this research evaluated the potential effectiveness of spatial, psychomotor, and leadership scales as additional selection criteria for the Excellence in Armor (EIA) program. The S^3 predictor tests were administered to 1,642 One Station Unit Training (OSUT) soldiers at the Fort Knox reception station. In addition, 479 19K (M1 tank crewmen) OSUT soldiers were given an engagement tank gunnery test on the high-fidelity Institutional Conduct of Fire Trainer (I-COFT). The I-COFT test included offensive and defensive engagements fired in normal and degraded operational modes. The primary analysis evaluated I-COFT speed and accuracy as a function of S^3 spatial/psychomotor scores. The S^3 spatial/psychomotor tests were a strong predictor of simulated tank gunnery performance, yielding a correlation of .54 with I-COFT speed/accuracy. The 2-1/2-month interval between the predictor and criterion tests suggests that the relationship should remain stable over time, and the relationship shrank only slightly when the EIA soldiers were given additional training. The results indicate that including the S^3 tests in the EIA selection process would result in EIA graduates with stronger gunnery skills.

RR 1511 Family Factors Affecting Retention: A Review of the Literature, Etheridge, R.M. March 1989 (AD A210 506) This report summarizes and critiques prior research linking family factors to soldier retention over the last 15 years. The research shows a consistent relationship between spouse support for the military career and both career intent and actual retention behavior. The more positive and supportive the spouse, the greater the likelihood of the soldier's remaining in the military. The solider's satisfaction with the military as a good place to raise a family, degree of organizational commitment, and satisfaction with military life are also related to retention. Awareness of the existence of community programs (even when they are not used) increases satisfaction with military life and enhances retention. However, the relationship between retention and satisfaction with specific family programs, policies, and other aspects of military life is less clear. Other features of military life have different effects on different families.

(1) Travel, relocation, and family separation are a source of stress and dissatisfaction for some families. For others they are viewed as neutral or even positive.

(2) Family separation and relocation have a stronger effect on retention than location. However, location of choice can be positive retention bonus.

(3) The magnitude of the effects of such factors as pay, retirement, benefits, deployments, family separations, working hours, job satisfaction, and marital satisfaction all depend on which stage of the "family life cycle" and "career life cycle" that the soldier is in.

(4) Female members of dual military couples are more likely than males to leave service. The

reasons for this difference appear to center on the difficulties these couples have in balancing work and family demands.

The review shows that little is known about the process used by families to make actual retention decisions. Such information should be useful to policy makers and program managers who would like to influence that decision to benefit the Army. The review also showed the need for multivariate and other more sophisticated research designs for testing the relative influence of key family variables in the stay-leave decision.

RR 1512 Embedded Training (ET) and Training Devices for the Howitzer Improvement Program (HIP): Volume I, Ditzian, J.L.; Sullivan, C.K.; Adams, J.F.; Bogner, M.S. November 1988. (AD B133 061) Embedded Training (ET), an integral part of weapon system design, offers what appears to be a unique training capability. As part of an effort to develop and implement procedures for designing ET, a task and training analysis was performed for the Howitzer Improvement Program (HIP), following procedures established earlier in the ET development effort. This report presrnts a functional design concept that encompasses ET and other types of training for the HIP. Hardware is proposed to fill the requirements of the proposed functions and guidelines are established for further development of training. Questions and tradeoffs that must still be dealt with are also enumerated. The task analysis data are contained in Volume II of this report, ARI Research Note 88-111.
This report also develops a training concept, training to full mastery, that may be specifically suited to ET.

RR 1513 Toward Meaningful Measures of Personnel Turbulence (Total Army Cohesion Enhancement: Selected Policy Recommendations), Boice, L.R.; Jacobs, T.O. March 1989 (AD A212 453) Findings from previous wars and the wisdom of the senior leadership of the Army suggest that personnel turbulence within units is a significant obstacle to the development of effective units. This report is intended to summarize some of the substantial literature on personnel turbulence in Army units, provide some current evidence that recent efforts to include COHORT have not sufficiently reduced turbulence, and offer an approach to reduce turbulence through policy change. The report concludes that stability measurements should be instituted as part of the Unit Status Report (USR) and recommends a strawman set of measures for that purpose.

RR 1514 Evaluation of an Army Recruiter Selection Program, Weiss, H.M.; Citera, M.; Finfer, L. March 1989 (AD A210 569) Effective selection of recruiters is essential to the success of the recruitment function. To meet this objective, a Recruiter Selection Battery-Experimental (RSB-X) was developed and was administered to over 400 recruiter selectees who entered the Army Recruiter Basic Course during May and June 1985. This report documents the results of analyses that examine the ability of the RSB-X and other recruiter characteristic data (awards, personal characteristics, longevity, type of appointment to recruiting duty, etc.) to predict recruiter success. Results of these analyses suggest that personality components and background data gathered by the RSB-X are generally not predictive of recruiter performance or turnover. Bio-data measures allowed for a tentative profile of the productive and tenured recruiter. The utility of any selection device in today's recruiting market precludes the effective use of selection testing for prospective recruiters.

RR 1515 Assessing the Impact of Mental Category on Simulated Tank Gunnery Performance, Graham, S.E. March 1989 (AD A210 319) The research evaluated the effects of mental ability on the gunnery performance of 19K One Station Unit Training (OSUT) soldiers. Five hundred forty-seven soldiers were given a 35-engagement tank gunnery test on the high-fidelity Institutional-Conduct of Fire Trainer (I-COFT). The I-COFT test included offensive and defensive engagements fired in normal and degraded operational modes. The primary analysis compared speed and accuracy performance as a function of mental category as derived from General Technical (GT) scores. The test scores were also used as parameter estimates in a soldier performance model based on Lanchester-type combat attrition models. OSUT soldiers with higher mental ability were faster and more accurate on the I-COFT test than were soldiers with lower mental ability. Mental category I and II soldiers his 14% more targets than category IV soldiers and were 2 seconds faster. The effects of mental ability were relatively the same for both normal and degraded mode exercises. Analyses based on the soldier performance model indicated that category IV soldiers performed at 73% of category I and II soldiers.

RR 1516 Personal Electronic Aid for Maintenance: Final Summary Report, Wisher, R.A.; Kincaid, J.P. March 1989 (AD A210 348) This report summarizes the findings from both Army and Navy evaluations of the Personal Electronics Aid for Maintenance (PEAM), which is a prototype electronic technical information delivery system capable of displaying step-by-step procedural information to technicians during their performance of maintenance tasks. The results demonstrate a nearly 6:1 advantage of PEAM (and its emulation on their microcomputers) over traditional, paper-based approaches to troubleshooting tasks, as well as a nearly 2:1 advantage in other tasks. The advantage was measured in terms of average errors per task. The report offers a set of enhanced functional characteristics base on lessons learned and supports electronic technical information delivery as a system for potentially reducing maintenance errors.

RR 1517 U.S. Army Noncommissioned Officers' Academic Skills Requirements, Harman, J.; Gagne, E.D.; Hickey, D.T.; Rositol, M.A.; Campbell, R.; Dowd, K.J. April 1989 (AD A210 849) This report describes work carried out to address academic skill requirements of U.S. Army Noncommissioned Officers (NCOs). Researchers reviewed job-task descriptions and interviewed Noncommisioned Officers about on-the-job performance. They also reviewed lesson materials and tests of the Noncommissioned Officer Education System, monitored classes at NCO Academies, and interviewed instructors, course managers, and students. Findings revealed that most training and tasks can be performed successfully if soldiers are equpped with basic- and intermediate-level skills. However, leadership tasks require advanced skills for successful performance. Findings will be used to develop programs of instruction that will correct academic skill deficiencies of Noncommissioned Officers.

RR 1518 Increasing the Combat Effectiveness of the Bradley Fighting Vehicle: New and Modified Thermal Training Procedures and Products, Champion, D.F.; Rollier, R.L.; Frederick, D.P.; Roberson, P.R.; Knapp, S.D. August 1988. (AD A212 456) This report describes exploratory research on the effects of camouflage, cover, and concealment on detection and classification of thermal targets. It is extremely difficult to conceal the thermal signature in a surveillance position. The use of cut foliage and defilade positioning, however,

were found to make classification and detection equally difficult. Researchers developed and field tested a set of thermal training guidelines that address sight control manipulation, scanning, target acquisition, and range estimation. These procedures, along with a slide presentation, form a thermal training package that is under review. Observation of gunners showed that some of the thermal sight controls rotated so freely that it was easy to inadvertently displace them. Experimentation showed that placing vinyl grommets between these knobs and the panel provided sufficient friction and solved this problem.

RR 1519 Modification of Selected Integrated Sight Unit Controls on the Bradley Fighting Vehicle, Champion, D.F.; Rollier, R.L.; Knapp, S.D.; Lewis, D.L. August 1988. (AD A210 461) The design of the contrast, brightness, and on/off controls of the Bradley Fighting Vehicle's (BFV's) thermal sight has resulted in frequent accidental displacement of setting. As this report shows, such accidental displacements delay and inhibit a gunner's ability to classify and engage targets. A solution to this problem has been experimentally tested. The contrast and brightness knobs had vinyl grommets inserted between the knobs and the panel face. The grommets provide sufficient friction to make accidental displacement unlikely. A guard was added to the an/off control to make accidental switching of the sight less probable.

RR 1520 Techniques and Procedure To Improve 25mm Gunnery of the Bradley Fighting Vehicle, Perkins, M.S. October 1988. (AD A212 132) Research has been conducted to develop and evaluate procedures and techniques to improve 25mm gunnery of the Bradley Fighting Vehicle (BFV). The approach for problem identification and development of solutions depended on the area of gunnery researched. This report summarizes research findings and products related to boresight equipment and procedures, zeroing procedures, firing control checks, battlesight gunnery, range estimation, aiming, and use of the auxiliary sight unit. Findings and products will be integrated into BFV Gunnery field manual (FM 23-1), recommended as changes or additions to the turret technical manual (TN 9-2350-252-10-2), and used to indicate design and operational problems with fielded boresight equipment.

RR 1521 Evaluation of a Low Fidelity Battle Simulation for Training and Evaluating Command, Control, and Communications (C^3) Skills for the Armor Platoon Leader, Lampton, D.R. May 1989 (AD A210 606) This report describes an investigation of the use of Simulation for Combined Arms Training (SIMCAT). SIMCAT is a low cost, low fidelity battle simulation developed for the Army Research Institute to train and evaluate tactical skills for leaders of small armor units. SIMCAT uses networked microcomputers, videodisc technology, and voice recognition and playback to symbolically represent critical variables needed to practice armor platoon C^3 skills. Twenty officers served as platoon leaders for Army Mission Training and Evaluation Plan (AMTEP) Field Training Exercises adapted for use with SIMCAT. Each exercise contained a tactical roadmarch, passage of lines, and movement to contact. AMTEP standards checklists were used to evaluate selected tactical tasks. Officers were tested on one exercise, received additional practice on that exercise, and then tested on a different exercise. The officers were Armor Officer Basic graduates. Half had field leadership experience since graduation; half had no postgraduate experience. Scores for the experienced officers were significantly higher than for those lacking field experience, and both groups showed improvement with practice. Officers' ratings of the training effectiveness of SIMCAT were favorable.

RR 1522 The Application of Computers To Learning in the Command and General Staff College: A Front End Analysis Study, Cognitive Engineering Design and Research (CEDAR) Team. May 1989 (AD A211 303) A front-end analysis was conducted on the expansion of the use of computers in instruction at the U.S. Army Command and General Staff College (CGSC). The knowledge, skills, and abilities (KSA) required of officers serving in staff positions are identified. Current curricula of the College are compared with this KSA and the College's performance in preparing officers for later assignments in staff positions is evaluated. Opportunities to improve instructions through further applications of computers to learning (ACL) are identified, and steps in a program for exploiting those opportunities are described. Recommendations concerning initiation of the program, including the immediate follow-on effort required, are made. This report presents only the findings and recommendations of the front-end analysis. Supplementary reports are separately bound. The reports all have the beginning title, Application of Computers to Learning in the Command and General Staff College. The follow-on headings for the other individual reports are as follows:
CGSC Analysis
Analysis of Staff Officer Knowledge, Skills, and Abilities
Assessment of Computers in Education at Various Institutions
Technology Assessment
Assessment of Computer Literacy in CGSC
Analysis of Institutional and Financial Constraints
Army Command and Control Concepts Study
Comparison of Knowledge, Skills, and Abilities to CGSC Learning Objectives
Identification of Computer Opportunities

RR 1523 Integrating National Training Center Feedback Into Home Station Training Management, Fobes, J.L.; Meliza, L.L. June 1989 (AD A213 436) Home station usage of National Training Center (NTC) Take Home Packages (THPs) was assessed and changes identified to enhance corrective and sustainment training. Rotating-unit commanders emphasized receiving information on mission outcome, major unit strengths and weaknesses, critical underlying events, and specific training recommendations for particular task force elements. A strawman revision reflects user interviews and capitalizes on potential benefits of ongoing initiatives to improve NTC and Home Station training.

RR 1524 MANPRINT Evaluation: AN/TRC-170 Digital Troposcatter Radio System, Krohn, G.S.; Bowser, S.E. June 1989 (AD A211 799) This document describes the Manpower and Personnel Integration (MANPRINT) Evaluation of the AN/TRC-170 Digital Troposcatter Radio System. The MANPRINT evaluation was conducted in support of the AN/TRC-170 Follow-On Operational Test and Evaluation (FOT&E) by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI). The FOT&E was conducted by the U.S. Army Operational Test and Evaluation Agency (OTEA) at Fort Huachuca, AZ, from September 1986 through January 1987. The purpose of the MANPRINT Evaluation was to identify human factors engineering, system safety, health hazards, training, and manpower factors leading to refinements in the AN/TRC-170 system. The MANPRINT evaluation methodology included structured interviews, on-site observations of operations and maintenance, and measures of task performance times. There were 24 MANPRINT findings involving equipment assembly and disassembly, materials handling procedures, and safety during road marches.

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RR 1525 MANPRINT Support of Aquila, the Army's Remotely Piloted Vehicle: Lessons Learned, Stewart, J.E., II; Smootz, E.R.; Nicholson, N.R. June 1989 (AD A211 207) The U.S. Army Research Institute (ARI) Systems Research Laboratory (SRL) supports the Army's manpower and personnel integration (MANPRINT) initiative in the testing and development of new systems. Operational Testing II (OT II) of the Aquila Remotely Piloted Vehicle revealed disappointing system performance thought to be due in part to manpower, personnel, training , and human factors problems. The SRL MANPRINT Task Force, headed by the Fort Hood Field Unit, was asked by Headquarters Training and Doctrine Command and the U.S. Army Field Artillery School to help identify the problems and recommend ways to resolve them. The SRL Task Force examined operator and maintainer MANPRINT concerns (e.g., target detection, mission planning, and maintenance manpower) and was able to recommend concrete ways to minimize the impact of these problems on total system performance.

RR 1526 Army Aviation Ammunition and Gunnery Survey. Volume II: Final Report, McAnulty, D.M.; Cross, K.D.; DeRoush, D.J. June 1989 (AD A211 307) This research compiled an empirical data base on the current training of active U.S. Army (AA) and National Guard (NG) attack helicopter units and estimated the resource requirements for qualifying and sustaining adequate levels of aviator gunnery proficiency. Separate versions of the Ammunition and Gunnery Survey were distributed to a sample of AA and NG aviators (Form A) and unit commanders (Form B). The aviators returned 810 usable Form A surveys (41% return rate). The unit commanders returned 127 usable Form B surveys (35% return rate). This report presents a summary of the major results of the survey data analyses. The primary conclusions drawn from the results are that (a) a substantial number of attack helicopter units are unable to meet the training standards with resources currently available to them, (b) gunnery ranges are not readily available to many units or have inadequate scoring methods, (c) flight simulators are being used only to a moderate extent by AA aviators for gunnery training, and (d) the current ammunition authorizations approximate the minimum number of rounds needed to qualify and sustain the average aviator's gunnery skills. The limitations of the survey data and the need for experimental studies of training effectiveness are also discussed.

RR 1527 Application of Training Research Literature to Maintenance Performance Training, Mirabella, A.; Macpherson, D.; Patterson, C. June 1989 (AD A217 594) For this report, we reviewed published data on maintenance performance deficiency at the U.S. Army Ordnance Center and School (USAOCS) and in U.S. Army Forces Command (FORSCOM) units. This review established a need for better training and job aiding of maintenance personnel. We then analyzed the literature on skill acquisition, retention, and transfer. From this literature we derived training and research implications. Finally, we generated a set of 10 guidelines for developing effective training. We found that failure among wheel vehicle mechanics to perform to standard is a significant but predictable problem. Many valid techniques and strategies exist which could reduce this problem to a negligible level, but they are not being used or are being used ineffectively. To implement them correctly, wheel vehicle maintenance training has to shift away from a "stand-up lecture/content oriented" philosophy to one that is "workshop/task oriented." The techniques and strategies have been condensed in the Guidelines for Improved 63W Training. These can be used to design a model

program of instruction at the U.S. Army Ordnance Center & School. However, they should be useful at other Training and Doctrine Command (TRADOC) installations as well.

RR 1528 Effects of the Advanced Map Interpretation and Terrain Analysis Course on Contour-Level Navigation Performance, Terrell, D.J. June 1989 (AD A212 163) For this report, researchers evaluated the effectiveness of the Advanced Map Interpretation and Terrain Analysis Course (MITAC) and compared two strategies of error remediation in computer-based training. Forty-one OH-58 student pilots were given an inflight contour-level navigation pretest at the beginning of the Basic Combat Skills (BCS) course. Two experimental groups, with 14 subjects per group, receives navigation training with the advanced MITAC in addition to the standard BCS training. The two groups differed only in the manner in which Advanced MITAC errors were remediated. For one group, errors were followed by a computer presentation of the correct answer and a brief explanation of the navigation strategy that would have produced the correct answer (i.e., computer-remediated). For the other group, errors were followed by a requirement to work the navigation problem again (i.e., self-remediated). A control group of 13 subjects received only the standard BCS training. At the end of the BCS course, a significantly larger proportion of experimental subjects than control subjects performed perfectly on an inflight navigation posttest. Of the experimental subjects who did not perform perfectly, those in the self-remediated group tended to stray slightly farther and to spend more time off course than those in the computer-remediated group. Supplemental training with the Advanced MITAC enhanced inflight navigation performance, and computer-generated error remediation was slightly more beneficial than self-generated error remediation.

RR 1529 Theater Army Medical Management Information System: A MANPRINT Evaluation, Smith, N.D.; Tiffany, J.R. June 1989 (AD A212 283) This reports presents the MANPRINT portion of the Initial Operational Test and Evaluation (IOT&E) of the Theater Army Medical Management Information System (TAMMIS) and the division level version of the system, TAMMIS-D. TAMMIS/TAMMIS-D are automated, on-line, interactive, microcomputer systems designed to manage combat medical information but capable of performing peacetime functions as well. The systems were developed to meet the needs of medical commanders by providing timely, accurate, and relevant information on the status of patients, medical units, and medical supplies on the battlefield. The IOT&E was conducted at Fort Lewis, WA in tents erected between two-story barracks buildings in January and February, 1988. Soldier operators and data collectors were provided by the 9th ID and I corps. Two test periods of 10 days each, 12 hours per day, were required—one for TAMMIS-D and one for TAMMIS. The TAMMIS-D test organization represented a battalion aid station, brigade surgeon. Six operators and four data collectors participated in the test of the two TAMMIS-D software subsystems. The TAMMIS test organization represented the combat support hospital, medical group, and the division surgeon. Twelve operators and nine data collectors participated in the test of the five TAMMIS software subsystems.
Conclusions
(1) The packages used to train operator personnel for both TAMMIS and TAMMIS-D before the start of the tests were inadequate. Retention or sustainment training will be required to keep the system operational.
(2) If the system is to be effective, all operators need an introductory course in computer

operation and all should have some typing ability.

(3) Workload-related test results were inconclusive due to confounding conditions during the test. However, all operators agreed that they would not be able to both care for the wounded and keep TAMMIS-D records up to date.

(4) All manuals need to be revised to improve ease of use.

(5) Fourteen specific problems with software must be corrected.

(6) There were numerous human factors problems with CRT lighting and CRT contrast.

(7) A "Help" line should be established with the experts who have both knowledge of the system and ability to communicate effectively with the target audience.

(8) The TACCS system is inordinately slow. It takes too long to boot up and can take an hour to generate one report. A faster CPU is required.

(9) No safety hazards were identified.

RR 1530 A Survey of Civilian Employee Attitudes, Hunter, D.R. June 1989 (AD A211 382) This report summarizes the findings of a questionnaire survey of approximately 1,000 civilian employees of the U.S. Army Aviation Systems Command and U.S. Army Troop Support Command. The survey was conducted as part of an organizational diagnosis in preparation for the implementation of a civilian personnel management demonstration project. The survey confirmed the presence of problems in supervisory authority, employee compensation and training, and perceived linkage between workers' performance and rewards. Analyses of responses to background information questions, individual attitude items, and scales constructed according to specifications provided by the Office of Personnel Management are presented. Repeated administration of the survey as part of the program evaluation is recommended.

RR 1531 Analysis of U.S. Army Enlisted Military Occupational Specialties for Rapid Train-up Program (RTUP) Application, Kraemer, R.E. June 1989 (AD A211 188) Fourteen U.S. Army service schools participated in a Training and Doctrine Command (TRADOC) sponsored research effort to identify U.S. Army Enlisted Military Occupational Specialties (MOS) suitable for training Individual Ready Reserve (IRR) soldiers using Rapid Train-up Program (RTUP) methods. The objectives of the research were to determine (a) which tasks at skill level 1 for each MOS were highly critical for combat; (b) which highly critical combat tasks were suitable for training IRR soldiers in an RTUP using a procedure guide, training guide, or no training materials; and (c) the average time required to provide refresher training to standard using a training guide. Data obtained from service school subject matter experts (SMEs) indicated that 88 of 141 MOS analyzed were suitable for RTUP training. Moreover, 68 of these MOS could be refresher trained using training guides during a 3-day time frame being considered by the U.S. Army Training Board (USATB) for conducting an RTUP program.

RR 1532 M1 Tank Gunnery: A Detailed Analysis of Conditions, Behaviors, and Processes, Meade, G.A. June 1989 (AD A217 416) This report establishes the domain of M1 tactical gunnery at the crew level. It categorizes the conditions that effect crew behavior in each of the segments of the gunnery process, with particular attention to the processes directly related to firing the tank weapons systems. The report presents a three-step model of tank gunnery, identifies fifteen sets of variables in the engagement process, and lists

all possible engagement patterns. The results can be used by the Armor School to develop tactical gunnery training and testing programs for the M1 tank.

RR 1533 AI Tools for Foreign Language Training, Swartz, M.L.; Psotka, J. July 1989 (AD A212 980) The Army needs to provide retention training in foreign languages for several military occupational specialties (MOS). With limited time and trainers to do so, developing computer training systems to support the training requirement is a viable solution. However, these computer systems need advanced technology such as Artificial Intelligence and natural language processing methods in order to deliver successful language instruction. We review the state-of-the-art technology in this report.

RR 1534 The Soldier Salesperson: Selection and Basic Recruiter Training Issues in the US Army, Benedict, M.E. July 1989 (AD A212 827) This report is the last of five reports that document a program on recruiter productivity. This document presents the consolidated results and expands on research for an Army recruiter selection program analysis and a basic recruiter training program evaluation. A brief overview of each project is provided, as are recommendations for future practices. Results reported in this document are drawn from documents, interviews, and data collected from October 1987 through April 1989 at the U.S. Army Recruiting Command, Fort Sheridan, IL, and at the Recruiting and Retention School, Fort Harrison, IN. This research focused on improving recruiter productivity and investigated the potential of the Recruiter Selection Battery Experimental (RSB-X) to predict performance on-the-job and in training. The project also investigated the quality of the formal school training provided to new recruiters.

RR 1535 Army Family Composition and Retention, Rakoff, S.; Doherty, J. July 1989 (AD A212 880) As part of the Army Family Research Program (AFRP), this research describes the demographics of family composition (marriage, childbearing) and the relationship between family composition and retention intentions. A data file of Army respondents to the 1985 Department of Defense (DoD) Survey of Officer and Enlisted Personnel was created and a series of new variables specified for this analysis. Additionally, data from the 1978-79 DoD Survey of Officer and Enlisted Personnel were used. The data analysis identified patterns of marriage and childbearing among Army enlisted personnel and officers. Further analysis focused on the relationship between family composition and change in family composition and the intent to remain in the Army as expressed in the survey instrument. The report is addressed to a policy and program audience. Fewer enlisted males entered the Army single in 1985 than in 1979. Also, more enlisted males had children at the time of entry. There were no differences in marital status for the two cohort groups of enlisted females, but more enlisted females entered with children in 1985 than in 1979; the percentage with children doubled over this period. The percentage of females who were single parents tripled from 1979 to 1985. More male and female officers were single at time of entry in 1985 than in 1979. Although the vast majority of Army personnel enter unmarried and without children, almost half of the enlisted males and two thirds of officer males are married with children. Only about one quarter of the women in the Army are married with children, but they have fewer years of service and are younger on average. When controlled by length of service, the differences between the males and females are smaller, but males are still more likely to be members of households with spouses and children than are females. Married personnel tend to have a higher intention on

remaining in the Army than do single personnel and officers; at each years-of-service (YOS) point, the average reenlistment probability was higher for married men than it was for single men and enlistment probability was higher for married men than it was for single men and more married than single officers expressed an intention to remain in the Army for a full career. For males, adding children to the family increases retention intent, except for officers who entered single but had children during the first 3 years of service. The opposite seems to be true for females. The Army Community and Family Support Center (CFSC) reviewed an earlier version of this report and stated that it will be useful in its work with families. the finding that marriage and parenthood increases with age and length of service suggests that the Army will need to increase the numbers and kinds of family supports available if it is to succeed in keeping a smaller/older force in the year 2000. The finding that females are more likely to be single parents suggests that the Army will need to increase supports for that group if the Army chooses to increase the percentage of females in the force. The finding that marital and fertility decisions are different for males and females who remain in the Army requires additional research to show how best to accommodate this phenomenon.

RR 1536 Contributions of the U.S. Army Research Institute to the Training Technology Field Activity—Aberdeen, Mirabella, A. August 1989 (AD A214 346) This report summarizes ARI's efforts to develop training guidelines for improved acquisition, retention, and transfer of vehicle maintenance skills. The need for such guidelines has been documented in 10 major studies since 1964 including 4 by ARI. The results of these studies are also summarized. The studies show that performance failure rates for diagnostic, remove/replace, and adjustment tasks are very high for both novice and experienced vehicle repairers. For example, the false removal rate (good parts mistakenly removed) is about 42% of all removals. The results of the Training Technology Field Activity (TTFA) projects summarized include various recommendations and guidelines for improving the training of vehicle repairers. One set of recommendations, for example, suggested ways to immediately improve the 63W10 course at the Ordnance School. The recommendations emerged from an onsite review of the entire 16-week course given to 63W10s at Aberdeen. One set of guidelines dealt with how to produce effective vugraphs for classroom instruction. Another set derived from a review of scientific literature on training provided general principles on how to develop on how to develop effective instruction principles. These results can provide a partial springboard for future research, development, and training technology transfer under a continuing TTFA program at the Ordnance school.

RR 1537 Backward Transfer and Skill Acquisition in the AH-1 Flight and Weapons Simulator, Kaempf, G.L.; Cross, K.D.; Blackwell, N.J. August 1989 (AD A213 432) Two experiments were conducted, one to investigate the backward transfer of flight skills to the AH-1 Flight and Weapons Simulator (AH1FWS) and another to investigate the acquisition of flight skills in the AH1FWS on selected maneuvers. In the backward transfer research, 16 AH-1 instructor pilots (IPs) from the AH-1 Aircrew Qualification Course were administered checkrides in the AH1FWS and AH-1F aircraft. Comparison of the performance data from the two checkrides indicates that, while proficient on the maneuvers in the AH-1F, all IPs performed poorly in the AH1FWS. The IPs attributed their difficulties in the AH1FWS to deficiencies in the visual system and the handling and response characteristics of the flight controls. In the skill acquisition research, four groups of 10 operational aviators received

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training in the AH1FWS. Each group received training on a different set of five maneuvers. The training comprised 10 practice trials for each maneuver. Subjects received no feedback on trials 1-3; IPs provided instruction on trials 4-10. Mean performance ratings did not reach a satisfactory level of proficiency within the 10 practice trials for 17 of the 20 maneuvers investigated. Furthermore, the backward transfer data obtained during the skill acquisition research were consistent with similar data collected in a previous study. The authors conclude that AF1FWS deficiencies adversely affect pilot performance on selected maneuvers. However, the extent to which these simulator deficiencies may affect subsequent pilot performance in the aircraft has not been determined. The research results provide evidence that the AH-1F aircraft and the AH1FWS are not interchangeable training devices and that forward transfer of training is required. In addition, the results support the utility of the backward transfer paradigm as a potentially useful means of estimating forward transfer of training and as a relatively inexpensive testbed for the development of experimental procedures.

RR 1538 Application of ARI Skill Retention Model to Wheel Vehicle Maintenance Tasks, Macpherson, D.; Patterson, C.; Mirabella, A. August 1989. (AD A219 684) The Skill Retention Model is a model that describes how people forget technical tasks in terms of such task characteristics as the number of steps in the task and the quantity of the job aids. We administered the Skill Retention Model to seven expert wheeled vehicle mechanical/instructors (SMEs) at the Ordnance Center School, Aberdeen, MD. A total of nine tasks were covered, five tasks in five hours on each of two days, with one task being evaluated on both days and one evaluator serving on both days. we identified three out of nine tasks that are rapidly forgotten. out of ten task characteristics, five differentiated the three tasks easily forgotten from those that are not easily forgotten. We recommend ways to improve training and calculated how much retention would increase with improved training.

RR 1539 Preliminary Assessment of Selected Predictors of Special Forces Qualification Course Success, Pleban, R.J.; Allentoff, H.L.; Thompson, T.J. August 1989. (AD A213 201) This report describes a follow-up research effort designed to examine the predictive utility of selected measures of intelligence (Wonderlic Personnel Test WPT), personality (Jackson Personality Inventory JPI), and biographical information predicting the successful completion of Phase I of the Special Forces Qualification Course (SFQC). Intelligence, personality, and biographical measures were obtained from 293 soldiers attending Phase I of the SFQC at Fort Bragg, NC. The relationships between two of the selected predictor measures, WPT and JPI, and the Phase I performance criteria were assessed through a correlation-multiple regression strategy. Predictive utility was assessed using a discriminant analysis procedure. Intelligence (WPI) correlated significantly with overall Phase I status and four JPI scales: Energy Level, Anxiety, Risk Taking, and Infrequency. The results further suggested that SF candidates who have had prior specialized training emphasizing land navigation, map reading, and patrolling (e.g., Ranger, Reconnaissance, Jungle Warfare) are likely to be much better prepared to complete Phase i successfully than those candidates who have not had such training. The implications of these findings are discussed.

RR 1540 Summary of Research on Combat Vehicle Identification Completed at ARI Fort Hood Field Unit, Fort Hood, Texas, 1980-1985, Warnick, W.L.; Smith, N.D. August 1989. (AD A217 451) This historical review was prepared to provide the Army

proponent for vehicle recognition, the U.S. Army Combined Arms Center (CAC), with a summary of research and development products emanating from the Army's "Target Acquisition and Analysis Training System (TAATS)" during the period 1980 to 1985. The report was prepared by the Fort Hood Field Unit of the U.S. Army Research Institute for the behavioral and Social Sciences. Sixty research projects)including 15 ARI-conducted TAATS efforts) that contributed to the TAATS research effort are summarized in this report. The summaries are extensive in that both the research methodology and the major research conclusions are presented and well documented. The Commander, U.S. Army Training and Doctrine Command (TRADOC), in 1979 centralized the proponency for vehicle recognition within the combined Arms Center (CAC ar Fort Leavenworth, Kansas. This action focused attention on the need for an effective and uniform combat vehicle recognition and identification program as a total Army requirement. In coordination with CAC, the ARI Field Unit at Fort Hood initiated the TAATS research program in 1980. The research resulted in the development of three Combat Vehicle Identification (CVI) instructional programs being added to the Government Training Aid (GTA) system, i.e., GTA 17-2-10, and GTA 17-2-11. Two video training films were developed for integration into TRADOC branch school curriculums. The major conclusions having the greatest impact on training and doctrine development are:

- The quality od a combat vehicle's image is not a critical factor in identifying the vehicle or in learning identification skills provided gross cues (e.g., chassis shape, turret shape and position, relative length of gun tube) are discriminable.
- The use of motion in depicting a vehicle is not critical in training soldiers in CVI.
- Training all combat soldiers in CVI skills may not be cost-effective. Approximately one0third of soldiers after four training trials failed to achieve the level of CVI proficiency reached by the other two-thirds after one learning trial.

RR 1541 Soldier Performance Research Project: Armor Field and SIMNET Tests, Graham, S.E.; Leet, W.T.; Elliott, G.S.; Hamill, J.P., Jr.; Smith, S.E. September 1989. (AD A214 345) The Phase II Armor Soldier Performance Research Project (SPRP) evaluated the effects of mental ability on the collective performance of armor crews in a high combat realism field exercise and a platoon tactical exercise in the Simulation Networking (SIMNET) system. One hundred twenty M1 tank commanders and drivers were formed into reconstituted tank crews as part of a third day of the war scenario. The TCs and drivers were paired as a function of four mental category groups as determined by the Armed Forces Qualification Test (AFQT). The results of the Field and SIMNET tests showed combat effectiveness to be clearly related to the mental ability of both the TC and driver. Differences in performance as a function of mental ability were not only found for the overall performance measures, but for precombat, command and control, communications, call for fire, grid coordinate determination, and encoding/decoding tasks. Analyses of the field test speed/accuracy composite showed that crews with CAT IV TCs performed at 67% of crews with CAT I&II TCs. Regressions analyses demonstrated that the mental categories of both the TC and driver were related to crew performance, with TC and driver AFQT scores accounting for 19% of the test variance. Skills Qualification Test (SQT) scores were also highly correlated with performance on the Armor SPRP tests. Together, AFQT and SQT predicted 30% of the SPRP variance. The Armor SPRP tests, taken together, demonstrated roughly a 25% difference betwwen the combat effectiveness of CAT I&II and CAT IV crews. Given that the United States is investing $2.5 million with each tank it gives an Armor crew, a 25% decrement in performance is costly. The

cumulative effects of mental category are even more dramatic when the SPRP findings are considered as combat multipliers. Consider the cumulative effects of the performance of CAT IV crewman. Relative to the performance of CAT I&II crewman, CAT IVs boresighted at 45%, hit targets at 73% (Phase I), performed with a speed of 81%, effectively called for fire at 67%, and reported accurate grid coordinates at 55%. Furthermore, combat leaders will have greater confidence in quality crews, which will facilitate the execution of bold decisive actions. Given that combat is a series of battles in which these tasks must be performed over and over, the cumulative effects of mental ability will substantially impact combat effectiveness. Higher quality soldiers equate to higher enemy attrition and higher unit survival.

RR 1542 Tank Platoon Training Using the Precision Range Integrated Maneuver Exercise (PRIME) System as Perceived by Company Commanders, Kraemer, R.E.; Koger, M.E. September 1989. (AD A217 449) This report presents the results of interviews on the use of the Precision Range Integrated Maneuver Exercise (PRIME) system. Eight tank company commanders were interviewed during the user test conducted by the Test and Experimentation Command (TEXCOM) (1 April-5 May 1989). Each commander was asked the following three questions: (a) which tasks from the Mission Essential Task List (METL) can be trained using PRIME, (b) what changes or enhancements are needed to improve PRIME, and (c) where can PRIME be used in the unit's over-all training strategy. Commanders stated that PRIME would support eight of nine platoon tactical operations either on the range or in conjunction with other tactical operations being performed using PRIME. Commanders wanted the following: (a) a reliable, functional system, (b) training on the system, (c) unit training packages, (d) prepared and proofed scenarios, (e) summarized feedback, (f) assistance in preparing other action reviews (AARs), and (g) the time and mileage to conduct training on the site. the commanders indicated that PRIME could be used (a) as a diagnostic tool to identify individual, crew, and platoon gunnery and tactical training needs; (b) for training both tank gunnery and platoon tactics; and (c) as an evaluation tool whereby performance "gates" can be established and met before live fire exercises.

Technical Reports

TR 603 Development, Standardization, and Validation of Officer Selection Battery, Forms 3 and 4, Fischl, M.A.; Edwards, D.S.; Claudy, J.G.; Rumsey, M.G. March 1986. (AD A177 806) This report describes the development, standardization, and validation of two parallel forms of a test to be used for assessing young men and women applying to ROTC. Fairly extensive job analysis work established a content basis for initial test item development: 1,400 experimental items in 12 job relevant content areas were prepared and administered to 3,306 college juniors who were enrolled in the Advanced ROTC program. Professors of Military Science completed a Cadet Rating Form on each student covering Officer Potential and six scales relating to dimensions of officer leadership. The sample was stratified to conform to the 1980 national distribution of SAT scores and to consist of 18% black cadets, 5% other nonwhite cadets, and 10% female cadets. Item analyses were performed using both the Officer Potential rating and the sum of the Officer Dimension ratings as criteria. Separate analyses were also performed for gender and ethnic subgroups. Items that would yield the most valid tests with the least gender or ethnic impact were selected for the final forms. For standardization, the tests were administered to college sophomores in military science courses, and the samples were again stratified to conform to the national distribution of SAT scores and the same gender and ethnic proportions. Results indicated that the tests were essentially equivalent, easily readable, and of high reliability. Separate norm tables were prepared for the two forms because of slight differences at the extremes of the distributions. A small separate investigation involved administration of the test to a sample of high school seniors, since ROTC selection tests are sometimes used at this level for admission to military junior colleges or for scholarship purposes. As expected, scores for this group were lower. Since the high school sample was small and very likely nonrepresentative, the high school norms that were prepared were considered provisional. Criterion-related validity was investigated twice. The test forms were administered to samples of senior ROTC cadets, and faculty ratings of leadership characteristics and officer potential were obtained for use as criteria. One of the test forms was also administered to Second Lieutenants in their first assignments (at Officer Basic Courses). Final course grades were obtained from the schools on these officers. Data analyses included correlations with criteria and, for the student sample, regression analyses for each form separately by gender and ethnic subgroups as well as the total group. On the basis of the analyses performed, the Officer Selection Battery was concluded to be empirically and content valid and of comparable validity for ethnic and gender subgroups, with no indication of differential validity or regressions.

TR 604 and 605 1982 publications.

TR 606 and 607 1983 publications.

TR 608 to 612 1984 publications.

TR 613 1982 publication.

TR 614 1983 publication.

Technical Reports

TR 615 to 624 1984 publications.

TR 625 1985 publication.

TR 626 to 631 1984 publications.

TR 632 Canceled.

TR 633 to 654 1984 publications.

TR 655 Canceled.

TR 656 to 658 1984 publications.

TR 659 to 661 1985 publications.

TR 662 Canceled.

TR 663 1985 publication.

TR 664 Canceled.

TR 665 to 667 1985 publications.

TR 668 Canceled.

TR 669 to 681 1985 publications.

TR 682 Canceled.

TR 683 to 688 1985 publications.

TR 689 Canceled.

TR 690 to 696 1985 publications.

TR 697 Evaluation of a Revised Individual Ready Reserve (IRR) Aviator Training Program: Final Report, Wick, D.T.; Millard, S.L.; Cross, K.D. January 1986. (AD A173 811) The objectives of the first phase of this project were to revise the Individual Ready Reserve (IRR) aviator training program developed by Allnutt and Everhart (1980) and to evaluate the effectiveness of the revised training program in a controlled training environment. The goals sought in revising the academic training were to minimize Instructor Pilot (IP) involvement in academic training and to minimize the amount of on-site training time that IRR aviators must devote to academic training. Accordingly, the academic portion of the IRR aviator training program was converted to a self-study format. The flight training procedure

employed was self-paced proficiency-progression procedure that enabled IRR aviators to complete flight training in the least amount of time commensurate with safety.

Forty-seven IRR aviators participated in the evaluation of the 19-day training program during the first training year. One-half of the IRR aviators who participated in the first-year evaluation returned 1 year later for a second 19-day, on-site training period. The main objective of the second-year training period was to compile data with which to assess (a) the knowledge and skill decay that occurs during 1 year with no practice, and (b) the training time IRR aviators require to regain the level of knowledge and skill achieved at the end of the first 19-day training period.

The results of this research support three major conclusions. First, IRR aviators are capable of reacquiring the requisite academic knowledge through self-study alone; most IRR aviators are willing to complete a substantial portion of the self-study at home, prior to their arrival at the training site. Second, even IRR aviators who have not flown for many years are able to reacquire flying skills in far less time than is required to acquire such skills originally. Finally, although academic knowledge and flying skills are acquired in less training time the second year than the first, the difference is relatively small; this finding indicates that most of the knowledge and skill decay that is going to occur over an extended period will have occurred by the end of 1 year without training.

TR 698   1985 publication.

TR 699   Empirical Status of Feuerstein's "Instrumental Enrichment" as a Method of Teaching Thinking Skills, Savell, J.M.; Twohig, P.T.; Rachford, D.L. June 1986. (AD A177 620) This paper examines some 35 reports of empirical research on Feuerstein's "Instrument Enrichment" (FIE) as a method of teaching thinking skills, and asks what can be concluded from these reports with respect to the following: (a) the nature and statistical reliability of FIE effects, and, for those effects that are statistically reliable, (b) the "amount" of FIE that appears to be required in order for these effects to appear.

TR 700   The 1985 Army Experience Survey: Methodology and Recommendations for Future Administrations, Westat, Inc. January 1986. (AD A178 569) The 1985 Army Experience Survey (AES) was designed to assess the characteristics and motivations behind enlistment and separation, and the attitudes and experiences of former soldiers. The survey was developed in part to provide information about Army veterans in response to questions raised by the Secretary of the Army, John O. Marsh, Jr.

Survey data were collected from systematic random samples representative of veterans separating from Army service during FY82-FY84. A basic overall sample was supplemented to produce larger samples among several of the smaller demographic/service groups within each of two key separation statuses. To reestablish the proper distribution of sample characteristics to resemble the population, sample weighting was performed. The survey effort involved sample location and tracing, and multiple mailings with telephone interviewing of nonrespondents. The period of data collection extended from April through mid-July 1985.

This report is the only volume in the AES report series that provides details of the project background, survey and data preparation methodologies, and recommendations for future administration of veteran surveys.

Technical Reports

The Data Sourcebook and User's Manual (ARI Research Note 86-1) documents the data files; eight desciptive tabular volumes (ARI Research Products 86-1 to 86-8) present preliminary results.

The complete list of reports is as follows:

RP 86-01. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Separatees, Volume I.

RP 86-02. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Separatees, Volume II.

RP 86-03. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Attritees, Volume I.

RP 86-04. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of First-Term Attritees, Volume II.

RP 86-05. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Mid-Career Separatees, Volume I.

RP 86-06. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Mid-Career Separatees, Volume II.

RP 86-07. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Enlisted Retirees, Volume I.

RP 86-08. *THE 1985 ARMY EXPERIENCE SURVEY:* Tabular Descriptions of Enlisted Retirees, Volume II.

TR-700. *THE 1985 ARMY EXPERIENCE SURVEY:* Methodology and Recommendations for Future Administrations.

RN 86-01. *THE 1985 ARMY EXPERIENCE SURVEY:* Data Source Book and User's Manual.

TR 701 Canceled.

TR 702 Towards an Understanding of Army Enlistment Motivation Patterns, Pliske, R.M.; Elig, T.W.; Johnson, R.M. January 1986 (AD A173 817) This report summarizes information from the ARI New Recruit Surveys for 1982 and 1983 related to enlistment motivations of new Army recruits. In addition to presenting cross-tabulated responses for survey questions, principal component analyses (PCA) were completed on recruits' responses to questions on their reasons for enlistment. The PCA indicated that recruits enlist for a variety of economic and psychological reasons, such as self-improvement, economic advancement, military service, time out, travel, and education money.

TR 703 Videodisc Interpersonal Skills Training and Assessment (VISTA): Overview and Findings, Volume 1, Schroeder, J.E.; Dyer, F.N.; Czerny, P.; Youngling, E.W.; Gillotti, D.P. January 1986 (AD A168 287) The Videodisc Interpersonal Skills Training and Assessment (VISTA) project was initiated as a means to use computer-assisted training/videodisc technology to reduce the high training costs associated with junior officer leadership skills training. Historically the major problem was simulating subordinates as they would probably respond in a given leadership situation; assessment center simulations and role playing could train leadership skills but not without high personnel costs due to the numbers of counselors and role players required.

Previous research indicated that a videodisc system could successfully train soldier skills even when only a fraction of the capabilities of the medium were used. Such a system could be used

to supplement the current role playing and, hence, reduce the number of support personnel required. The research effort included topic analysis, hardware selection, software development, scenario writing, studio production, editing, and videodisc mastering. Final evaluation of the videodiscs produced included the administration of two tests, a test designed to measure the acquisition of leadership skills and a subjective preference test designed to measure user acceptance. Nine highly interactive videodisc training scenarios covering 20 leadership problems were produced. Overall evaluation results indicated a VISTA superiority followed by role playing and programmed text, and with the majority of students indicating that a combination of videodisc and role playing would be optimal for leadership training. Results also indicate that although VISTA products were designed for the Infantry Officer's Basic Course, the problems addressed are probably common to other Army branches and should therefore be investigated for possible application in other training centers.

TR 704 Cooperative Learning: Effects of Task, Reward, and Group Size on In-dividual Achievement, Hagman, J.D.; Hayes, J.F. January 1986. (AD A173 828) This research sought to (a) determine whether cooperative learning can effectively promote individual achievement, and if so, (b) identify specific conditions under which a benefit can be expected. In each of two experiments, trainee Equipment Records and Part Specialists, Military Occupational Specialty (MOS) 76C, received 15 blocks of instruction on how to perform specific supply-related tasks as part of Advanced Individual Training (AIT). Blocks 1-7 and 9-14 consisted of lecture-based instruction followed by a practical exercise after each block. Blocks 8 and 15 were devoted to testing. Experiment 1 compared the test performance of 280 trainees after they had completed practical exercises (PEs) under either cooperative or individual learning. Under cooperative learning, trainees worked together in groups of two or four and helped each other learn. Under individual learning, they worked alone and obtained help from an instructor rather than from each other. In addition, group members were rewarded (i.e., allowed to proceed through the course without attending remedial study halls) either independently or as a group for their subsequent individual test performance. Results revealed that (a) cooperative learning improved individual trainee test scores but only when coupled with a group reward contingency, and (b) significant benefits occurred once group size reached four members. Experiment 2 employed 80 additional trainees to determine why group reward was necessary for obtaining enhanced individual achievement under cooperative learning. Two potential hypotheses were tested: that group reward effects were caused by increased individual trainee motivation to learn resulting from group pressure to perform, or that group reward encouraged groupmates to share information and that this "peer tutoring" facilitated individual learning. Test performance results supported the peer tutoring hypothesis. The significance of these findings for Army training is that individual achievement gains can be obtained through cooperative learning in four-member groups without modifying training materials and without increasing the demand for training resources.

TR 705 1985 publication.

TR 706 The 1984 and 1985 ARI Survey of Army Recruits: The Methodology and Recommendations for Future Administrations, Westat, Inc. May 1986. (AD A180 291) This is a task final report. The volume overviews the survey administration procedures, including instrument design, data collection, data preparation, and processing

techniques employed in the 1984 and 1985 ARI Surveys of Army Recruits. The report proposes recommendations for future surveys that address problems inherent in performing ad hoc surveys, and contrast survey outcomes from low-cost versus high-cost survey administrations.

TR 707 Predicting Performance of M1 Gunners, Black, B.A.; Mitchell, K.J. April 1986. (AD A176 649) This research was designed to evaluate a battery of M1 gunner performance prediction tests. Specifically, the work sought to (1) determine the relationship between hands-on job sample tests and computerized counterparts, (2) ascertain how these relate to Armed Services Vocational Aptitude Battery-based ability measures, and (3) determine how the tests relate to tank gunnery measures. Data were obtained for 123 M1 tank gunners from 4 battalions. Composite scores were derived from five hands-on predictor tasks: (1) tank engagement, (2) snakeboard tracking, (3) computer panel enter/check data, (4) computer tank engagement, and (5) computer tracking. Data were also obtained on a motivation inventory, the Armed Forces Qualification Test, and the Pattern Analysis subtest of the Armed Services Vocational Aptitude Battery, Forms 6/7. Criterion data included supervisor ratings and Table VIII annual gunnery scores. Results for the target engagement test subtested that this task might be successfully computerized. Performance on M1 Computer Panel Tests was found to relate to the Armed Forces Qualification Test. While no relationships for supervisor ratings and Table VIII day scores and predictor tests were observed, some hands-on measures were seen to correlate with Table VIII night scores.

TR 708 The Impact of Sol ier Quality on Performance in the Army, Horne, D.K. April 1986. (AD A173 946) The Army has been successful in improving its manpower quality over the last several years. Recruits are scoring higher on the Armed Forces Qualification Test (AFQT) and are more likely to have high school diplomas than in any year since the inception of the All-Volunteer Force. Recruiting such personnel is expensive, however, as the Army faces increased competition from the civilian labor market, educational institutions, and the other services for a shrinking youth population. In order to justify its manpower quality requirements, the Army must be able to demonstrate an empirical link between AFQT scores and soldier performance. This study presents evidence on that relationship using data from several sources. The first data set contains written and hands-on tests on several weapons systems from the Army's training schools. The second data set utilizes the Skill Qualification Tests administered by the Army. The results demonstrate that a statistically significant and positive relationship exists between AFQT scores and performance measures. These findings are consistent across a wide range of Military Occupational Specialties.

TR 709 Army Manpower Cost System (AMCOS): Active Enlisted Force Prototype, Frankel, O.L.; Butler, R.A.; Carpenter-Huffman, M. March 1986. (AD A169 669) This paper presents a prototype Army Manpower Cost (AMCOS) model for determining manpower costs of weapon systems. AMCOS is based on economic, accounting and actuarial theories of costing and includes comprehensive manpower costs from recruitment to retirement. An application of AMCOS is presented which estimates enlisted manpower cost trade-offs between the Bradley Fighting Vehicle (BFV) and the M113 Armored Personnel Carrier in mechanized infantry battalions. The conclusion is that the BFV is cost-effective compared to M113.

TR 710 Performance of Soldiers on the Battlesight Tank Gunnery Video Game, Abel, M.H. June 1986 (AD A178 446) The purpose of this research was to examine practice effects on a tank gunnery video game in a series of three experiments. Number of hits and number of first-round-hits were collected over trials in Experiments 1 and 2. Based on duty position, subjects were divided into experienced and inexperienced groups in both Experiments 1 and 2. The experienced groups consisted of Tank Commander/Gunners and the inexperienced groups were Driver/Loaders. Subjects used the gunner's primary sight in Experiment 1 and the gunner's secondary sight in Experiment 2. Significant improvement was found in the number of hits and the number of first-round-hits over practice trials in both Experiments 1 and 2. No differences were found between the experienced and inexperienced groups in the first two experiments. Subjects' accuracy and speed were examined over trials under two different game formats and two different target kill zones in Experiment 3. Accuracy was measured by the percentage of hits and the percentage of first-round-hits. Speed was measured by the average time to fire, which was computed by dividing the elapsed game time by the number of rounds of ammunition fired. The game formats were (a) the standard video game with three lives and 60 rounds of ammunition, and (b) a revised format that equally distributed the three lives and 60 rounds of ammunition into three separate games. A rectangle totally surrounding a threat tank represents the kill zone, i.e., a round of ammunition hitting in the rectangle destroys the target. The kill zone was reduced from 100% of the rectangle (standard kill zone) to 50% of the rectangle (reduced kill zone), which greatly decreased the vulnerable area around a target. Results of Experiment 3 indicated that the reduced kill zone groups were significantly less accurate than the standard kill zone groups. Improvement in accuracy was demonstrated when subjects used the revised video game format. No improvement was found when subjects used the standard game format. Improvement in the average time to fire was found for all groups.

TR 711 Training Lessons Learned From Peak Performance Episodes, Fobes, J.L. June 1986. (AD A174 186) An examination of episodes of peak performance indicates that three cognitive components enable these episodes: psychological readiness (activating optimal arousal and emotion appropriate for the task), information processing (attending to and interpreting key stimuli), and endurance management (controlling fatigue and pain for sustained performance). There is also evidence suggesting that endorphins underlie these three processes. Accordingly, performance can be enhanced through two strategies; one technique is teaching self-regulation of endorphin levels. The other more immediately available solution is to use contemporary sports psychology training techniques to optimize cognitive processes underlying superior performance. With either strategy, optimal performance will result from an enhanced ability to cope specifically and continuously tailored to meet the conditions and demands of a particular activity.

TR 712 Research Integration: An Essential for Military Psychological Research, Oliver, L.W. June 1986. (AD A177 807) This article encourages military psychologists to learn about and apply nontraditional (quantitative) approaches to research integration in tropical areas of interest to military psychology. Various research integration approaches (literary, vote-counting, combining significance levels, and meta-analytic) are summarized. Also discussed are the advantages of meta-analytic approaches to research integration as well as some of the problems posed by the use of such quantitative procedures. Implications for

military psychology include more complete reporting of research results, integration of research in areas of interest to military psychologists, and identification of research gaps. Cross-service collaborative efforts are urged to accomplish the research integration step and to plan programmatic research to fill the gaps in our cumulative knowledge.

TR 713 An Enhanced Instructional Design Process for Developing Interactive Courseware, Marco, R.; Begg, J.; Israelite, L.; Bernstein, K. June 1986. (AD A177 532) This report contains a description of the design process developed to create interactive computer-based courseware for the Model Training Program for Reserve Component Units (MTP-RC). The first part of the report describes the limitations of the standard Systems Approach to Training (SAT) process when applied to the design of the highly interactive computer-based training (CBT) and the reasons why the design team sought to increase the efficiency of the process. The second and major part of the report describes the design processes that were developed and added to the SAT model and how they were used to create MTP-RC courseware. The major enhancements to SAT were (a) the use of analysis and design procedures focused at the course level, (b) the development and use of decision-making guidelines to aid the selection of content and the selection of instructional strategies, and (c) the application of software engineering techniques to CBT.
The application of these design tools can aid other instructional designers in creating computer-based training coursware more efficiently.

TR 714 Training Courseware Enhancement and Refinement of the Hand-Held Tutor, Bridgeman, B.; Fertner, K. June 1986. (AD A174 689) A previously developed hand-held vocabulary tutor was adapted to teach basic mathematics to combat engineers and fire commands to M1 tank commanders. Modifications were made in the hardware and internal software to make the tutor more useful in a training environment that went beyond simple vocabulary instruction. An existing set of instructional booklets was modified for presentation on the device. The modified materials were revised in accordance with findings from a formative evaluation, and the complete system was then used in a small-scale field test, the results of which indicated that the device functioned as intended.

TR 715 Canceled.

TR 716 Development and Field Test of Army-Wide Rating Scales and the Rater Orientation and Training Program, Pulakos, E.D. (ed.); Borman, W.C. (ed.). July 1986. (AD B112 857) The research described in this report was performed under Project A, the U.S. Army's current, large-scale manpower and personnel effort for improving the selection, classification, and utilization of Army enlisted personnel. This research sought to develop dimensions of soldier performance for evaluating first-term soldiers in any Military Occupational Specialty empirical scales. Behavioral analysis was used to identify and define effectiveness dimensions. The Skill Level I Common Task Soldier's Manual guided development of another set of rating scales in several task areas involving all first-term soldiers. A rater training program was prepared to help peers and supervisors make accurate evaluations using the Army-wide scales.
The rating scales and training program were field tested for nine MOS. A total of 904 supervisor and 1,206 peer raters evaluated a total of 1,369 first-term soldiers. Results were encouraging.

Raters appeared to understand and comply with instruction, rating distributions were acceptable, and interrater reliabilities were reasonably high. The field tests also provided information that guided refinement of both the rating scales and the rater training program.

The appendixes that present additional documentation for this research are contained in a separate report with limited distribution (ARI Research Note 87-22, April 1987): *Development and Test of Army-Wide Rating Scales and the Rater Orientation and Training Program: Appendixes to ARI Technical Report 716.*

TR 717 Development and Field Test of Task-Based MOS-Specific Criterion Measures, Campbell, C.H.; Campbell, R.C.; Rumsey, M.G.; Edwards, D.C. July 1986. (AD A182 645) The research described in this report was performed under Project A, the U.S. Army's current, large-scale manpower and personnel effort for improving the selection, classification, and utilization of Army enlisted personnel. This report documents the development and field tryout of task-based MOS-specific knowledge tests, hands-on tests, task performance ratings, and job experience questionnaires for nine Military Occupational Specialties (MOS). Job performance domains were derived from Army Occupational Survey Programs (AOSP) results, Soldier's Manuals, and proponent agency input. Subject-matter expert judgments of task criticality, difficulty, and similarity were used to select tasks for test development. All tests were pilot tested on Skill Level 1 soldiers and noncommissioned officers. Field tests were conducted among 114-178 soldiers per MOS. Results were used to revise the instruments and to provide evidence of reliability and validity. Proponent agencies provided technical reviews before the field tests and after the instruments were revised. Hands-on and knowledge tests exhibited reasonable variability, as did the rating scales. Correlations between the two test methods were high, but do not suggest that either should substitute for the other. Rating scales correlated more highly among themselves than with the tests, as would be expected from their surface dissimilarity and affective focus. Job experience emerged as a potentially important factor in explaining performance variability.

The instruments were finalized for the upcoming Concurrent Validation, where they will serve as criterion measures for a new predictor battery designed to supplement the Armed Services Vocational Aptitude Battery (ASVAB).

TR 718 Setting Battalion Recruiting Missions, Nelson, A.; Phillips, C.E.; Schmitz, E.J. July 1986 (AD A175 782) This research explores the use of an alternative method for missioning the Army's recruiting battalions. Data envelopment analysis (DEA) is used to evaluate existing missions and to set new missions based on efficient production.

TR 719 U.S. Army Reenlistment and Extension by Occupation: A Reduced-Form Trinomial Probit Approach, Terza, J.V.; Warren, R.S. July 1986 (AD A182 139) This report presents estimates of the Lakhani-Gilroy model of the extension and reenlistment choices of first-term Army enlistees, using the reduced-form trinomial probit approach developed by Terza (1985). The principal advantage of the probit framework over the multinomial logit estimator used by Lakhani and Gilroy (1984) is that the former does not impose the theoretically restrictive assumption of the independence from irrelevant alternatives (IIA). The IIA assumption is especially troublesome in the context of the present study, since it is likely that the extension and reenlistment alternatives are perceived to be closer substitutes than either extension and separation or reenlistment and separation. Consequently, the

multinomial logit model would almost surely predict too high a joint probability of extending or reenlisting. The probit estimates were compared with those obtained with the multinomial logit estimator and a variant of the latter, which imposes the constraints on the reduced-form coefficients that are implied by the structure of the underlying utility equations. Unfortunately, the model performed poorly across all three estimation techniques, so it was difficult to evaluate them unambiguously. Only the coefficient on the selective reenlistment bonus variable consistently displayed the expected sign and, simultaneously, was significantly different from zero. Especially disappointing was the performance of the military-civilian relative pay variable, in light of its success in the Lakhani-Gilroy study. On the basis of predictive accuracy, the constrained logit model dominated both the unconstrained logit and probit formulations. On the other hand, tests of the null hypotheses that (1) the constraints are empirically valid and (2) the IIA assumption characterizes the data were both decisively rejected. As a whole, these results suggest that the model is misspecified and that both the constraints and the functional form affect its performance. Consequently, further development of the theoretical model and an investigation into the computational feasibility of a *constrained probit* estimator would seem to be warranted.

TR 720 Canceled.

TR 721 Evaluating the Benefits and Costs of the Enlisted Personnel Allocation System (EPAS), Schmitz, E.J.; McWhite, P.B. July 1986. (AD A177 619) The Army Research Institute, with the assistance of the General Research Corporation, is undertaking a project to modernize and improve the way the Army determines the Military Occupational Specialty (MOS) for which an individual should be trained. This project is called the Development of the Enlisted Personnel Allocation System (EPAS). A key task in the EPAS development is the performance of a benefit-cost analysis of the prototype system that will provide important information on the potential benefits of improving accession management and training seat allocation. To support the benefit-cost analysis, a series of simulations were run which demonstrated the capability of EPAS to operate feasibly under realistic scenarios. Further, EPAS is likely to produce substantial improvements over present soldier allocation procedures.

TR 722 An Examination of the Research Evidence for Computer-Based Instruction in Military Training, Shlechter, T.M. August 1986. (AD A174 817) Consistent empirical evidence does not exist to support or deny claimed advantages of computer-based instruction (CBI) over other instructional media for (a) reducing training time; (b) reducing life-cycle costs; (c) facilitating students' mastery of the instructional materials; (d) accommodating individual learning differences; and (e) motivating students' learning. The lack of empirical support for these issues is not totally explained by problematic courseware. CBI, especially future generations of this medium (e.g., intelligent computer-based instruction), promises to have a significantly positive impact on students' cognitive processing. CBI also promises to help slow learners. Problematic research procedures were found throughout the CBI literature. Most noticeable among these research problems were (a) confoundings due to the differences in instructional content; (b) making comparisons with inappropriate media; (c) confoundings due to "program novelty effects" and "teacher attitudes"; and (d) findings that were not replicated. One recommendation about future CBI research is that researchers should shift focus from examining the inherent superiority of this medium to identifying conditions

for using computers in the instructional process. It is also recommended that CBI might be most useful as an instructional tool to supplement the established instructional program.

TR 723 Propensity and the Enlistment Decision, Nord, R.D.; Schmitz, E.J.; Weiland, T.A. August 1986 (AD A178 444) This research examined the relationship between actual military enlistments and enlistment intentions, educational expectations, and other factors. A number of factors, including enlistment intentions, were found to predict enlistment behavior. Projected enlistment rates, given changes in significant factors, are reported.

TR 724 Evaluation of the U.S. Army Basic Skills Education Program, Hahn, C.P.; Krug, R.E.; Rosenbaum, H.; Stoddart, S.C.; Harman, J. October 1986 (AD A178 650) This report covers a 5-year evaluation of the Army's Basic Skills Education Program. It details the evaluation methodology and the activities carried out, as well as problems encountered and the effects of these problems on the work. Results indicate that the program's impact is favorable in that participants consistently showed improvements in test scores. However, substantial numbers of soldiers graduated from these programs without meeting criterion levels of test performance.

TR 725 Annotated Bibliography of Tactical Engagement Simulation 1966-1984, Sulzen, R.H. October 1986 (AD A178 671) Tactical Engagement Simulation (TES) has greatly improved the effectiveness of tactical training. This report traces its history and provides an annotated bibliography. The history of this major training method—its requirement, concept, evolutionary development, and implementation—provides insights into requirements and processes for successful fielding of new training systems.

TR 726 Fitting Learning Curves With Orthogonal Polynomials, Sabol, M.A. December 1986 (AD A181 148) A FORTRAN program that generates orthogonal polynomials is listed. These polynomials can be used to analyze learning curves into components that can then be tested separately for significance (planned comparisons). The program is appropriate to situations in which data are obtained from equally spaced intervals, as is naturally the case when the independent variable is trials, and also to situations involving unequal intervals (e.g., when data are available from the first, second, fourth, and eighth trials only). A demonstration of the component analysis is provided for both the equal interval and unequal interval situation. These analyses result in best-fit curves that reflect only those components that have proved significant. An appendix lists all orthogonal polynomials for situations with equal intervals and up to 20 trials. This listing greatly extends those currently available in the statistical literature, which provide all polynomials only for situations with up to 7 trials.

TR 727 An Application of Simulated Annealing To Scheduling Army Unit Training, Hart, R.J.; Goehring, D.J. October 1986 (AD A180 292) Automated scheduling of Army training can reduce the complexity of scheduling the many required training and nontraining activities for a unit and lead to better planning of training. The objective of the research described here was to develop a prototype program for applying a particular heuristic called "simulated annealing" to the scheduling of Army unit training. The report presents an analysis of scheduling needs in Army units and describes the simulated annealing approach to Army scheduling. The characteristics and operations of the implementing algorithm are

detailed with the computer code as an Appendix. The approach was judged as promising and warranting further research. Several augmentations of the current implementation of the simulated annealing approach are suggested.

TR 728 Development and Psychometric Testing of the Strategy Inventory for Language Learning (SILL), Oxford, R.L. November 1986. (AD A182 625) This report is part of a Language Skill Change Project, a longitudinal research effort to determine the status of skills of Army linguists after formal language training is over. The work described concerns development of a valid and reliable instrument to measure the frequency of use of various second language learning strategies. Findings indicate that key factors in long-term retention are study skills, functional practice, searching for and communicating meaning, formal practice, mnemonics, and fear of using the second language.

TR 729 Land Navigation Skills Training: An Evaluation of Computer and Videodisc-Based Courseware, Lickteig, C.W.; Burnside, B.L. November 1986. (AD A181 031) This research effort evaluated the training effectiveness of computer and videodisc-based courseware developed for training basic land navigation skills. The land navigation skills addressed by the courseware included the identification of natural terrain features, map-terrain association for orienting a map and determining a location, intersection, resection, and terrain analysis. The evaluation used a pretest-posttest design, and all training and tests were delivered on-line by the computer delivery system. Control conditions were included to ensure that improvements on posttest measures were due to training effectiveness rather than participants' increased familiarity with test formats and the computer delivery system. Results for three of the tasks—Intersection and Resection, Identify Terrain Features, and Terrain Analysis—showed significant improvement in posttest performance and raised participants from a pretest average of "NO GO" to a posttest average of "GO". Results for these tasks also showed the courseware to be more efficient than conventional training methods and user friendly. For the other two tasks—Orient a Map and Determine Location by Map Terrain Association—courseware design modifications are needed and design recommendations are discussed.

TR 730 An Evaluation of the Training Requirements of Army National Guard Aviators. Phase I: Analysis of Questionnaire Data, Szabo, S.M.; Ruffner, J.W.; Cross, K.D.; Sanders, M.G. November 1986. (AD A180 639) Army National Guard (ARNG) aviators must meet the same aviation training requirements as active Army aviators. During the past 10 years, the training requirements have significantly increased; yet, the amount of time allocated for ARNG aviators to meet the requirements has remained relatively constant. To determine if the aviators need additional allocated training time, a survey was conducted. The survey indicates that ARNG aviators perceive the time allocated for meeting their current training requirements to be generally inadequate. The aviators are willing to spend additional paid time to meet the requirements and are unwilling to spend additional nonpaid time. The major obstacles to meeting the requirements are an insufficient number of flight hours, unavailability of instructor pilots (IPs), and an insufficient amount of personal time. The data suggest that additional time is needed to meet the training requirements. Information about the amount of time needed will be provided by the Phase II training log survey.

TR 731 Unaware Memory in Hypothesis Generation Tasks, Brooks, J.E.; Drum, B.H. December 1986. (AD A179 859) Memory researchers have distinguished two forms of memory: deliberate recollection of prior events versus the unaware influence of prior events on the performance of a later task. This research investigated the nature of this distinction by further delineating the conditions under which aware and unaware memory are observed to be independent. Two experiments tested whether items presented for study would influence performance on a hypothesis generation task regardless of subjects' ability to recognize the items. Depth of processing of the study items was also manipulated to test whether this variable would have a different effect on hypothesis generation and recognition. The hypothesis generation task in Experiment 1 required subjects to generate category instances. In Experiment 2, subjects formed hypotheses about the possible use of a described land area. After the hypothesis generation phase of each experiment, primed hypotheses were tested for recognition. Data analyses for both experiments revealed that particular hypotheses were primed by study items and that priming was unrelated to recognition performance. Level of processing of the study items influenced recognition but not priming. These results suggest that hypothesis generation, a relatively complex cognitive task, may be added to the growing list of tasks in which unaware memory is observed. The data also encourage the exploration of unaware memory in a variety of tasks, including the systematic comparison of situations in which the phenomenon does and does not occur.

TR 732 1985 publication.

TR 733 Military and Civilian Earnings: An Index Number Comparison, Dale, C. February 1987. (AD A181 033) There has been continuing interest in the question of how well paid soldiers are relative to their civilian counterparts. Historical comparisons are shown here for several components of military pay, including basic pay, subsistence and housing allowances, and tax advantages. The results of this study show that soldiers' pay has kept pace with inflation since 1981, but that higher ranking soldiers are still underpaid relative to their counterparts who had the same rank, years of service, and marital status in 1972.

TR 734 Bonuses, Wages, Training Costs, and Quit Rates: A Three Stage Least Squares Approach, Lakhani, H.A. February 1987. (AD A179 907) This report analyzed the impact of Regular Military Compensation (RMC) and Selective Reenlistment Bonuses (SRB) in a system of three stage least squares regressions. The results reveal that an increase in RMC and SRB reduces quit rates. Also, SRB is being rightly increased with an increase in training costs and civilian wages in both combat and non-combat arms groups of occupations.

TR 735 The 1986 ARI Survey of U.S. Army Recruits: Technical Manual, Benedict, M.E. April 1987. (AD A182 738) This is one of eight reports produced to document the 1986 Army Research Institute Survey of U.S. Army Recruits, also known as the New Recruit Survey (NRS). This volume describes the project background, instrument development and content, sample design, survey administration, database development, and documentation. Technical Appendixes contain copies of each survey form administered in 1986, coordination letters to reception battalions, physical descriptions of the survey databases, and a comprehensive crosswalk of all survey variables that appeared in the 1983 through 1986 Enlistment Decision

Survey instruments. Other reports in this series provide more extensive background documentation of the 1986 New Recruit Survey. Tabular descriptions that present the preliminary results of the 1986 survey separately for each Army component are available.

TR 736 Program Management Offices: Structural Modeling Through Application of Stratified Systems Theory, Rigby, C.K.; Harris, P.A. April 1987. (AD A181 940) In response to a request from the Assistant Secretary of the Army (Research, Development, and Acquisition), this study examined (1) Program Management Office (PMO) structure over its life cycle, (2) roles and relationships between PMOs and their respective major subordinate commands (MSCs), and (3) career development of Program Managers (PMs). Data collection consisted of 60 interviews of commanders, deputy commanders, program/project managers, and directors within three of the U.S. Army Materiel Command's MSCs: Tank Automotive Command (TACOM), Aviation Systems Command (AVSCOM), and Troop Support Command (TROSCOM). Information gathered through the interviews was compared to the Stratified Systems Theory model of organizational structure and role relationships proposed by Jaques (1983). Data analyses showed a trend of increased workload for the MSCs as a result of force modernization and information requirements generated at higher levels. The impact of these external requirements on the program management offices was explored. Models of SST organizational structure were explicated at levels V, IV, and III, and two PMO models were constructed for the development and production/fielding phases of the life cycle. Knowledge, skill, and leadership capabilities for PMs were collected and classified by life cycle demands.

TR 737 Development and Field Tests of the Army Work Environment Questionnaire, Olson, D.M.; Borman, W.C. May 1987. (ADA182 078) Empirical research has investigated work performance in terms of taxonomies of abilities values and personality characteristics. However, until recently little research has focused on developing environmental taxonomies or examining relationships between these factors and performance criteria. Although field studies have supported associations between environmental variables and affective reaction to the job, these variables have shown only weak and inconsistent relationships with performance ratings. In this research, a 14-dimension environmental taxonomy containing variables that had both a facilitating and inhibiting influence on soldier performance was identified through application of a critical incident methodology. Further, a 110-item Army Work Environment Questionnaire (AWEQ) was developed to measure these job- and climate-oriented environmental dimensions. The influence of these environmental variables on a comprehensive set of supervisor and peer ratings of soldier effectiveness, job knowledge tests, and hands-on measures was examined for a sample of about 1,300 Army enlisted personnel from nine military jobs. Principal component factor analyses with a varimax rotation indicated that a 5-factor solution consisting of (1) Resources and Equipment, (2) Support, (3) Skills Utilization, (4) Perceived Job Importance, and (5) Unit Cooperation and Cohesiveness provided a parsimonious explanation of the underlying Army environment constructs. Significant (p .05) correlations were found between such environmental variables as Perceived Job Importance, Skills Utilization, and Support and both ratings and the more objective performance measures. Implications for future research are discussed.

TR 738 Alternative Approaches To Modeling the Individual Enlistment Decision: A Literature Review, by Zirk, D.A.; McTeigue, R.J.; Wilson, M.; Adelman, L.; Pliske,

R. May 1987. (AD A184 498) This report summarizes the findings of previous scientific decision-making literature in an effort to specify a model depicting the many facets of the individual enlistment decision. The following theories/models were reviewed: Decision Theory, Social Judgment Theory, Information Integration Theory, Conjoint Measurement/Unfolding Theory, Cognitive Decision Theory, and Expectancy Theory. The areas of career and consumer decision-making research were also reviewed. The extended Fishbein-Ajzen expectancy theory was recommended for modeling the individual enlistment decision.

TR 739 Development and Field Test of the Trial Battery for Project A, Peterson, N.G (ed.). May 1987. (AD A184 575) This research was performed under Project A, the U.S. Army's large-scale manpower effort to improve selection, classification, and utilization of enlisted personnel. This report deals with development and field test of a battery of experimental tests to complement the Armed Services Vocational Aptitude Battery in predicting soldiers' job performance. Findings from an extensive literature review, expert judgments on validity of measures identified in the review, and administration of a preliminary battery of "off-the-shelf" measures guided the development of new tests. Three major types were prepared: paper-and-pencil tests of cognitive ability; computer-administered tests of perceptual/psychomotor abilities; and paper-and-pencil inventories measuring temperament, biographical data, and vocational interests. After iterative pilot tests and revisions, the measures were field tested. Analysis indicated the new tests had adequate to excellent psychometric qualities, were relatively unique, and were not unduly affected by practice or by faking in an applicant setting. The resulting Trial Battery contains six cognitive paper-and-pencil tests, 10 computer-administered perceptual/psychomotor tests, and two paper-and-pencil inventories measuring temperament, biodata, and interests. It is being used in the next Project A phase, concurrent validation executed with FY83/84 accessions to evaluate the predictor measures against subsequent job performance. This report is supplemented by a limited-distribution Research Note, *Test Appendixes to ARI Technical Report 739: Development and Field Test of the Trial Battery for Project A*, ARI Research Note 87-24, April 1987.

TR 740 Questions Asked During Command Language Learning: Implications for Knowledge Representation, Swartz, M.L. May 1987. (AD A185 126) This paper discusses an investigation into the psychological role of question asking during a procedural learning task. Questions were interpreted using a conceptually based context-dependent model. Data was collected in a learning-by-doing paradigm following a socratic-like tutoring session and analyzed using this interpretation model. The kinds of questions asked during learning are descriptive of the knowledge state for the questioner at a given point in the tutoring/learning situation. Results indicate an emergence of a pedagogically functional question set inherent to the domain skill. A cluster of three question types appears to function as the main method for acquiring and understanding knowledge during the early stages of learning. Questions were found to be articulated at the boundaries of strategy shifts as subjects evaluated their problem-solving methods for achieving solutions in the problem space for the task. These results may have implications for defining student models, for creating more effective dialogue systems in intelligent computer tutors, and for improving instructional strategies.

Technical Reports

TR 741 Development of a Model of Soldier Effectiveness, Borman, W.C.; Motowidlo, S.J.; Rose, S.R.; Hanser, L.M. May 1987. (AD A191 625) This research was performed under Project A, the U.S. Army's large-scale manpower effort to improve selection, classification, and utilization of Army enlisted personnel. It is part of the effort to develop dimensions of soldier performance to be reflected in "Army-wide" rating scales for use in evaluating first-term soldiers in any Military Occupational Specialty (MOS). A review of the literature and previous experience with enlisted Army soldiers provided the basis for a preliminary conceptual model of individual soldier effectiveness. Behavioral analysis workshops involving 77 officers and noncommissioned officers then provided more than 1,300 examples of effective and ineffective soldier behavior. Another 61 officers and NCOs sorted these examples into categories and rated the effectiveness level for each behavior. Seventy-eight percent of the examples were consistently retranslated into a single category within a narrow range of effectiveness. Comprehensive behavioral definitions were prepared for each of the 11 dimensions represented, and behavior-based rating scales for use as Army-wide criteria in Project A validation research were developed. This Technical Report is supplemented by ARI Research Note 87-29, *Development of a Model of Soldier Effectiveness: Retranslation Materials and Results.*

TR 742 The Role of Learning Strategies in Second Language Acquisition: Strategy Use by Students of English, O'Malley, J.M.; Chamot, A.U.; Kupper, L.; Sabol, M.A. June 1987. (AD A192 006) This paper describes a study of learning strategies used by high school students who were effective or ineffective in learning English as a second language. "Think aloud" data were collected during listening tasks that varied in familiarity and difficulty. Failure of students to appear for sessions was such that results were analyzed only from five effective listeners who attended three sessions and from three ineffective listeners who attended one session. The primary results were that effective listeners used self-monitoring and elaboration strategies significantly more often than did ineffective listeners during session one. Also, effective listeners were found to use the inferencing strategy twice as often as ineffective listeners, although this effect failed to reach significance because of the small sample size. However, effective listeners were found to significantly increase their use of imagery and elaboration from session one to session three. Altogether, these results are consistent with the theory suggesting that the use of strategies, especially metacognitive ones, is a major distinguishing characteristic of effective listeners.

TR 743 The Role of Learning Strategies in Second Language Acquisition: A Model for Research in Listening Comprehension, O'Malley, J.M.; Chamot, A.U.; Walker, C.; Sabol, M.A. June 1987. (AD A190 787) This paper extends the discussion of Anderson's theory presented in an earlier paper and shows in detail how the theory can be used to describe the role of learning strategies in second language acquisition. While strategies used in acquiring productive language skills are discussed briefly, the model focuses on listening comprehension, since this is a fundamental skill and one that generally precedes other skills during acquisition. The model raises research questions concerning (a) mental processing during listening and (b) learning strategies that can be used to enhance listening comprehension.

TR 744 The Role of Learning Strategies in Second Language Acquisition: A Selected Literature Review, O'Malley, J.M.; Chamot, A.U.; Walker, C.; Russo, R.P.; Kupper, L.; Brooks, L.; Sabol, M.A. June 1987. (AD A190 967) This paper describes theoretical developments in the cognitive psychology of second language acquisition. One conclusion reached is that such theories have not been sufficiently developed to permit a descriptive analysis of the role learning strategies play in acquiring language skills. A second conclusion is that language skills have characteristics in common with other complex cognitive skills that can be described within the cognitive theory of John Anderson. Anderson's theory is seen as having promise for serving as the foundation for a research model on the role of learning strategies in second language acquisition.

TR 745 Analysis of Feedback in After Action Reviews, Downs, C.W.; Johnson, K.M.; Fallensen, J.J. June 1987. (AD A188 336) The After Action Review (AAR) process was analyzed to evaluate the adherence to principles of effective feedback. Principles were identified through synthesis of the feedback literature and organized into three areas" feedback sources (participation), feedback content, and feedback message structures. Message content analysis was performed on six video-tapes from the Army Training Battle Simulation System (ARTBASS) AARs. The results indicated that both effective and ineffective feedback behaviors occurred. The major ineffective procedure was the AAR leader's infrequent use of the questioning technique to stimulate involvement by the training audience. Other AAR feedback practices are discussed.

TR 746 Improving the Selection, Classification, and Utilization of Army Enlisted Personnel: Annual Report, 1985 Fiscal Year, Campbell, J.P. (ed.). June 1987. (AD A193 343) This report describes the research performed during the third year (FY85) of Project A, the Army's long-term program to develop a complete personnel system for selecting and classifying all entry-level Army enlisted personnel; it also summarizes the developmental work done during the first two years of the project. During the third year a wide variety of criterion and predictor measures were pilot tested, refined, and field tested. These efforts resulted in the Trial Battery being used in the "Concurrent Validation" phase, in which testing was begun during FY85 with a sample of several thousand soldiers. This report is supplemented by an ARI Research Note (in preparation), which contains a number of technical papers prepared during the year on various aspects of the project.

TR 747 The Computerized Adaptive Screening Test (CAST): An Examination of Test Validity and Test Fairness, Knapp, D.J.; Pliske, R.M.; Elig, T.W. June 1987. (AD A186 999) The Conputerized Adaptive Screening Test (CAST) is used by Army recruiters to predict prospective applicants' (i.e., prospects') performance on the Armed Forces Qualification Test (AFQT). CAST performance data were collected from 60 recruiting stations across the country throughout calendar year 1985. These data were matched to applicant tapes from Military Entrance Processing Stations (MEPS) to obtain AFQT scores and relevant demographic information. Data analyses indicate that CAST is quite good at predicting AFQT scores for the entire sample and for examinees grouped by sex and race (black or white). When corrected for restriction in range, the cross-validated validity estimate based on the whole sample is .86. Race and sex differences in prediction exist, but these differences are minor and they correspond to those differences found with most cognitive ability tests. CAST's accuracy

at predicting subsequent classification into important AFQT categories (i.e., 1-3A and 1-3B) is also discussed.

ADA 194326

TR 748 1986 Early Career Satisfaction Survey: Analytic Report, Lockhart, D.C.; Wagner, M.; Cheng, C. June 1987. (AD A193-878) The 1986 Early Career Satisfaction Survey (ECSS) was designed to determine the effectiveness of the Joint Optical Information Network (JOIN). The survey collected data on soldiers' attitudes and job satisfaction as part of a longitudinal analysis of first-term soldiers. Among other findings, the results indicate that the use of JOIN increases soldiers perceptions of the completeness of information given to them by recruiters.

TR 749 Case Studies of Officer and Enlisted Single Parents in the Army: Performance, Retention, and Quality of Life, Teplitzky, M.L.; Hedlund, M.; Nogami, G. June 1987. (AD A190 581) This research was based on in-depth interviews with 27 single parents and their immediate supervisors. Short case histories were constructed for each single parent by integrating information obtained from both the single parents and supervisors. Findings derived from such a small sample cannot be construed as representative of the population of single parents in the Army. However, the case studies provide useful insight into the diversity of personal, family at work situations, single parents encounter, and the variety of ways they respond to their different circumstances. The case study analyses also indicated that supervisors did not attribute performance problems of strengths in those they supervised to factors associated with single parent status. In the eyes of supervisors, the impact of personal characteristics (e.g., motivation, professionalism) on performance and readiness seemed to far outweigh the impact of any situational constraints associated with being a single parent. Four more general themes were also identified from the case study analyses: (1) the importance of time to single parents, and the stress produced when work or family demands unexpected or inordinate amounts of time; (2) the prevalence of childcare problems, especially finding arrangements flexible enough to accommodate a military schedule; (3) the facilitative effect of a supportive and somewhat flexible work environment; and (4) the problems and anxiety associated with frequent relocations, especially the need to reestablish the network of social and childcare supports that enable single parents to function. The paper concludes with recommendations from the single parents, themselves, concerning ways the Army could make their lives easier.

TR 750 USSR: Future Battlefield Threats to U.S. Armored Systems, Kutyreff, E. June 1987. (AD C955 202) The future battlefield will impose new threats to armor vehicles, many of which were not even imagined a few years ago. Some of these threats will produce catastrophic kills on armor systems, while others may degrade system performance without destroying the entire system. These threats include lasers, high power microwaves, enhanced nuclear effects, particle beam weapons, advanced chemical and biological agents, and other futuristic weapons. The report discusses broad classes of weapons such as directed energy or chemical weapons and includes within those classes specific threats such as lasers, ct weapons, smokes and aerosols. Emphasis is given to emerging and nonconventional threats. For each threat, the general effects that it can be expected to exert on armor are described. Effectiveness levels are estimated for each threat weapon and probable deployment dates are projected. Each threat is described along with its possible configuration, damage mechanism through with it

manifests itself, and supporting logic as to how estimates about deployability and lethality were derived. In addition to the threat information presented in this report, it includes a substantial bibliography of readings concerning future threats to armor systems.

TR 751 Lessons Learned in Research on Command Group Training, Kaplan, I.T. July 1987. (AD A186 996) This report summarizes lessons learned in research on command group training conducted by the Army Research Institute's Fort Leavenworth Field Unit from 1976 to 1984. The lessons learned are grouped under the headings of training objectives, performance measurement, training effectiveness, and feedback. Major results include the development of more objective measures of command group performance, the finding that battle simulations satisfy certain training objectives better than others, and the beneficial effects of providing additional feedback during training. The lessons learned in this research were used in the development and operation of battalion command group training systems. They can also be used to facilitate the development of future systems to train command groups at corps and division levels.

TR 752 The Effects of Two Study Methods on Memory, Mutter, S.A. July 1987. (AD A186 997) Although organizational theory and the depth of processing framework have had considerable influence on memory research, there has been little effort directed toward integrating the ideas of these two approaches. The present research focuses on this issue in an investigation of how relational (organizational approach) and item-specific (depth of processing approach) semantic processing affect recall and recognition memory. The major finding in three experiments was that optimal recall performance is associated with relational semantic processing whereas optimal recognition performance is associated with item-specific semantic processing. Additional findings were that recall advantages following relational processing hold only for an immediate test of memory; that recognition advantages following item-specific processing are associated with slow retrieval-based recognition responses and not with fast, familiarity-based responses; and that semantic confusion errors in recognition are reduced by item-specific semantic processing. Overall, these results suggest that performance on tests involving the reconstruction of study list materials (e.g., recall) can benefit from organization of these materials during study. Performance on tests that do not require extensive constructive processes do not benefit from organizational processing during study, but may be enhanced by extensive semantic processing for individual study list items.

TR 753 Training Countermeasures for Degraded Thermal Sight Gunnery, Witmer, B.G. July 1987. (AD C955 812L) Bayer (1986) identified directed energy as a threat to thermal sighting systems. This report investigates the possible effects of degrading the M1 tank thermal sight on soldier performance and training countermeasures that may be necessary to counter this threat. A prototype of the M1 Videodisk Gunnery Simulator (VIGS) was used to simulate a damaged M1 thermal sight. Forty-eight experienced gunners were tested under simulated degraded thermal sight conditions and measures of their gunnery speed and accuracy were recorded. Thermal sight degradation effects and appropriate countermeasures were discussed.

TR 754 The Development of Administrative Measures as Indicators of Soldier Effectiveness, Riegelhaupt, B.J.; Harris, C.D.; Sadacca, R. August 1987. (AD A191 232)

Technical Reports

This research was performed as part of Task 4 of Project A, Improving the Selection, Classification, and Utilization of Army Enlisted Personnel. Task 4 is concerned with the development of Army-wide job performance criteria. The specific objects of this activity were (a) to determine which administrative indexes have sufficient variance and acceptable base rates to warrant consideration in the formation of criteria and in-service predictors of soldier effectiveness, (b) to combine these indexes within a set of soldier effectiveness dimensions into psychometrically sound and conceptually meaningful variables, and (c) to identify from which archival sources it is most feasible to obtain them.

TR 755   Towards Enhancing Written Communication Skills in the Army: Cognitive and Metacognitive Perspective, Baker, L. August 1987. (AD A197 396) This report presents a selective review of the psychological literature on writing. The aim is to provide an overview of pertinent research findings and instructional technology to assist in the development of effective programs for enhancing soldiers' written communication skills. The first section of the report focuses on issues of writing competence in the Army. The second reviews basic research on cognitive and metacognitive aspects of writing. The final section is concerned with instructional implications and focuses primarily on the potential contributions of computer software.

TR 756   A Comparison of Terrain Association and Resection as Methods of Position Location, Dewey, G.I.; O'Hanlan, J.T., Jr. August 1987. (AD A189 480) This research examined two methods of position fixing, terrain association and resection to determine which would result in faster and more accurate judgments of location. The research was conducted in the Surface Navigation and Orientation Trainer (SURNOT), which projects slide images a full 360 degree field of view. Two groups of soldiers (n = 12 each) were shown terrain scenes, given a 1:50,000 topographic map of the area, and located their position by terrain association and resection. Overall, performance was poor: There was no significant difference in accuracy of solution between the two groups (723 meters average error), but terrain association was approximately 3 minutes faster. The results were interpreted in terms of a two-stage position fixing model, and suggest that errors in position fixing occur early in the process.

TR 757   Development and Field Test of Job-Relevant Knowledge Tests for Selected MOS, Davis, R.H.; Davis, G.A.; Joyner, J.N.; De Vera, M.V. August 1987. (AD A192 211) The research described in this report was performed under Project A, the U.S. Army's current, large-scale manpower and personnel effort for improving the selection, classification, and utilization of Army enlisted personnel. This research sought to develop tests that will provide information about the performance of soldiers in training. Specifically, this task was (1) to create reliable and content-valid Job-Relevant Knowledge Tests (JRKTs) for 19 Military Occupational Specialties (MOS) that can measure the cognitive component of training success, and (2) to develop the JRKTs to predict first- and second-tour job performance. This report describes the methods used to develop the 19 JRKTs, and the characteristics of the various test versions as they evolved from the initial item pools. The JRKTs were developed in three batches (A, B, and Z) consisting of 4, 5, and 10 MOS, respectively. Initial item pools were based on Army Occupational Survey Programs, Programs of Instruction, and other relevant Army reference materials. Job incumbents and school trainers reviewed the test items for technical accuracy and for importance and relevance to Skill Level 1 soldiers. The test items were also

administered to groups of trainees in their last week of training. Batches A and B were field tested with job incumbents, and the test item parameters were analyzed; Batch Z will, in effect, be field tested in the Concurrent Validation test administration (June-November, 1985). Based on the available data, each JRKT was carefully tailored to ensure that the test content is a reliable and valid representation of training success.

TR 758 The Development and Evaluation of Moving Target Engagement Training Programs With the M16A1 Rifle, Hunt, J.P.; Parish, J.R.; Martere, R.F.; Osborne, A.D.; Evans, K.L. September 1987 (AD A190 847) Moving target engagement training is conducted on the Fort Benning Defense Test Range (DTR), which is equipped with the Remoted Target System (RETS) and uses a stationary and moving target attack/retreat scenario. In June 1985 a research effort was initiated to examine current Advanced Rifle Marksmanship (ARM) training at the DTR and to conduct research on alternative methods of training moving target engagement. Several variations of training devices and procedures were developed and evaluated. Strategy incorporating existing resources, as well as a special training devices strategy, were developed and tested. Findings indicated that both training strategies significantly increased moving targets hit by low-ability shooters from pretest to posttest. In addition, both strategies resulted in more posttest moving target hits than the current training program.

TR 759 Spatial Cognition and Map Interpretation, Tkacz, S. September 1987. (AD A190 583) The effectiveness of the Map Interpretation and Terrain Association Course (MITAC) developed by the Navy Personnel Research & Development Center was evaluated, in cooperation with the First Marine Division at Camp Pendleton, CA. MITAC instruction significantly improved subjects' ability to perform terrain association, a critical skill in position location. In addition, individual differences in spatial abilities were assessed to identify cognitive components underlying map interpretation. Two components, orientation and visualization, were found to be equally important for predicting real-world position location. Additionally, comparison of experimental and control groups' spatial aptitude scores indicated that the success of MITAC in improving terrain association was not a result of increased spatial aptitude. Instead, the course was effective because it taught a procedural, orientation strategy that can be learned by those with low spatial ability.

Finally, field and classroom performance was compared to wayfinding in a simulated (video-game) environment in which position coordinates were available during play. Game performance was significantly related to both field and classroom performance, and to spatial aptitude. High-spatial-aptitude individuals travelled farther between requests for position information, suggesting that they have larger spatial memory spans.

TR 760 Cooperative Learning: A New Approach for Training Equipment Records and Parts Specialists, Brooks, J.E.; Cormier, S.M.; Dressel, J.D.; Glaser, M.; Knerr, B.W.; Thoreson, R. September 1987 (AD A189 431) This research investigated the usefulness of cooperative learning for promoting individual achievement in the Equipment Records and Parts Specialist Course (MOS 76C). Cooperative learning students in four-member groups with group reward were compared to individual learning students on measures of course achievement, task completion speed, and study hall attendance. Student and instructor attitudes toward cooperative learning were also assessed. A trial implementation phase resulted in

several procedural modifications, whereas the second phase was a controlled evaluation. The results showed that cooperative learning reduced academic recycling by about one half and had no effect on the test performance of most students. Students working in groups on practical exercises (PEs) made fewer errors than students working alone. Groups, however, often took longer to complete PE assignments. Normal training schedules were not disrupted by increased PE completion times or by increases in study hall attendance resulting from group rewards. Most students and instructors liked cooperative learning. It was concluded that cooperative learning is a feasible, low-cost approach that offers cost savings through reduced student recycling. Procedural modifications that may increase achievement benefits are noted, and future research directions are suggested.

TR 761 The Effects of Bonuses on Army Reserve Reenlistments: An Empirical Bayes Approach, Dale, C. October 1987 (AD A188 770) The President's Sixth Quadrennial Review of Military Compensation placed special emphasis on reserve compensation. This paper was written in support of the Sixth QRMC. Empirical Bayes estimation techniques have been especially useful in applications where existing data bases have been small or incomplete. An empirical Bayes analysis of Army Reserve reenlistment data showed that bonuses increased committed man-years of service and that 6-year bonuses are most cost-effective than 3-year bonuses.

TR 762 Attribute Assessment: Initial Test of Scales for Determining Human Requirements of Military Jobs, Smith, E.P.; Rossmeissl, P.G. October 1987 (AD A188 656) The Attribute Assessment Scale (AAS) was developed empirically to enable noncommissioned officers (NCOs) to estimate profiles of human attributes required for different military occupational specialties (MOS). Two experiments were run to test AAS in terms of its interrater agreement and in terms of the differentiation of attributes within and across MOS. The first experiment included a tri-level performance criterion: NCOs from two MOS provided three ratings of the level required of 22 attributes for work in their own MOS. Results indicated a number of problems, some attributable to the complex criterion (e.g., confusion, response set, ceiling effect). The second experiment, which included three MOS, corrected for some, but not all of the problems. The conclusion from the two efforts was that interrater agreement and differences observed across MOS, although minimal, were sufficient to warrant further tests of the scale. These future efforts should examine effects of criterion specificity and types of scale authors on the estimates obtained.

TR 763 An Enumeration of Research To Determine the Optimal Design and Use of Army Flight Training Simulators, Cross, K.D.; Gainer, C.A. October 1987. (AD A191 242) This document lists and describes research the authors judged necessary to determine the optimal design and use of Army flight training simulators. Two major lines of research are described; the first addresses the design fidelity issue. Specifically, research is described that is judged necessary to determine the most cost- and training-effective level of fidelity for four simulator components: the visual system, the motion systems, the math models that determine the handling qualities of the flight simulator, and the cockpit displays and controls. The purpose of the second line of research is to determine how best to use production simulators that have been or are soon to be acquired by the Army. This line of research focuses primarily on the use of production simulators for field unit aviators who have completed

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institutional training and have been assigned to an operational field unit. However, the second line of research addresses some issues associated with the use of flight simulators for institutional training at the U.S. Army Aviation Center received before the aviator's first assignment to an operational unit. This document was prepared to serve as a vehicle for initiating meaningful dialogue among the agencies and personnel who share responsibility for optimizing the benefits of the Army's Synthetic Flight Training System (SFTS) program; it has not been officially endorsed by any Army agency.

TR 764 Effects of NBC Protective Equipment and Degraded Operational Mode on Tank Gunnery Performance, Abel, M.H. October 1987. (AD A191 233) Tank gunner's performance in the M1 Unit Conduct of Fire Trainer (UCOFT) was tested while wearing Mission Oriented Protective Posture (MOPP) gear under normal and emergency operational mode conditions. A pretest, in both experiments, determined initial performance for possible use as a covariate on experimental test performance. In Experiment I, the subjects performed six different test exercises. Results of Experiment I indicated that MOPP gear and normal operational mode degraded aiming error only. The degradation in performance was dependent on the type of exercise. In Experiment II, the subjects performed four different test exercises. Results of Experiment II revealed degradation on all performance measures during emergency operational mode. No performance decrements were found for MOPP gear and no interaction between MOPP gear and operational mode occurred. The degradation in fire time and aiming error caused by emergency mode was dependent on the type of exercise. Multiple correlations between fire time and experience variables were significant, particularly overall time as a gunner.

TR 765 Estimating Computer-Based Training Development Times, Jay, J.; Bernstein, K.; Gunderson, S. October 1987. (AD A191 268) The Army Research Institute (ARI) and other government organizations involved in military training are major users of computer-based training (CBT). In the bidding and procurement process for CBT development contracts, there is a need for specific criteria for determining appropriate cost ranges. Part 1 provides an examination of the issues in making accurate CBT development cost estimates. Part 2 of this report provides useful descriptive information about the current methods CBT developers use to estimate costs and the range of development times required to produce CBT, as well as the factors developers believe have the greatest effect on cost. Part 3 describes current costing models and evaluates a CBT development costing tool currently on the market. The report makes recommendations for improving the CBT development costing process. The results and recommendations contained in this report could provide a basis for other researchers to develop a development costing tool to be used throughout the industry to improve the contracting process.

TR 766 Validation of Psychomotor and Perceptual Predictors of Armor Officer M-1 Gunnery Performance, Smith, E.P.; Graham, S.E. November 1987. (AD A191 333) This research examined the validity of a computerized and paper-and-pencil psychomotor and perceptual test battery for predicting M-1 gunnery performance. Using the Unit Conduct of Fire Trainer (UCOFT) M-1 simulator, 95 second lieutenants in armor Officer Basic courses were administered the battery at the beginning of training and were tested on gunnery skills near course completion. Stepwise regression of UCOFT Composite Score resulted in a multiple

R = .76, with seven variables in the model. Using discriminant analysis with this subset of variables, 94% of the sample were correctly classified into the top 95% and bottom 5% of the Composite Score distribution; 80% were correctly assigned to the upper and lower thirds of the distribution. Although these findings require cross-validation, they provide useful information as the first step in developing an Armor Officer preaccession screen.

TR 767 Army Manpower Cost System (AMCOS): Concept and Design for a Life Cycle Cost Model for Active Army Manpower, Hogan, P.F.; Black, M.; Hunter, R.W.; Rose, D.E., Jr.; Zuckerberg, J.A. November 1987. (AD A189 521) This report discusses the first year in the development of the Army Manpower Cost System (AMCOS). The project will design and build a family of budget, economic, and life cycle cost models over a 5-year period. The report sets forth a concept and design for a life cycle cost model for active Army manpower. The report describes how

1. Consistent methodology, a comprehensive data base, and a sound theoretical approach produce accurate estimates for problems with manpower costs that vary over time.
2. The materiel system cycle, acquisition cycle, and personnel career cycle all influence a manpower life cycle cost model.
3. The model takes into account relevant analytical and practical issues.
4. Modular design of the essential components of the completed operational model centers on a structured cost data base.

The report also describes how the original AMCOS development plan was adjusted to develop a life cycle cost model for active Army manpower by the end of the first year and to defer budget and economic models for later development. The report presents alternatives for second-year development that would enhance the now operational lead model for active Army manpower, extend development to build Reserve and civilian models, or do portions of both.

TR 768 Final Report on a National Cross-Validation of the Computerized Adaptive Screening Test (CAST), Knapp, D.J. November 1987. (AD A192 020) The Computerized Adaptive Screening Test (CAST) is used by Army recruiters to predict prospective applicants' subsequent performance on the Armed Forces Qualification Test (AFQT). A modified version of the CAST software was used in 60 recruiting stations across the country from January through December 1985 to collect CAST item-level performance information. Screening test data were matched to applicant records from Military Entrance Processing Stations to obtain ASVAB scores and relevant demographic information. The cross-validated, corrected correlation between CAST and AFQT scores is .83. CAST's ability to predict important AFQT performance categories and Army Aptitude Area scores was also examined. Alternative subtest lengths were evaluated and item bank characteristics were described.

TR 769 The Development and Evaluation of Advanced Rifle Marksmanship Training Programs With the M16 Rifle, Hunt, J.P.; Lucariello, G.; Martere, R.F.; Parish, J.R.; Rossi, M.J. December 1987. (AD A191 452) In May 1987 a research effort that examined current Advanced Rifle Marksmanship (ARM) training conducted during One Station Unit Training (OSUT) at Fort Benning, Georgia, was initiated. This research evaluated night fire with no illumination, normally scheduled night fire training with artificial illumination, and protective mask fire during daylight. Alternative methods of training were tested in addition to night fire training using the AN/PVS-4 night vision sight. Separate alternative training

methods were tested for protective mask fire during daylight. All training procedures developed during this effort used existing range facilities and training resources. Additional resource demands were confined to increases in training time allocation and extra ammunition. Findings indicated that soldiers had extreme difficulty in hitting targets during night fire with no illumination and with artificial illumination. Results for night fire using the AN/PVS-4 night vision sight showed that soldiers were capable of hitting targets out to 300 m. Findings for protective mask fire during daylight also indicated that soldiers were capable of hitting targets out to 300 m.

TR 770 Framework for Research on Leadership, Cohesion, and Values, Butler, J.S.; Blair, J.D.; Phillips, R.L.; Schmitt, N. November 1987. (AD A192 070) The purpose of the following report is to develop a systematic framework for research on cohesion in conjunction with leadership and values. The report is divided into an introduction and four sections. The first section, entitled "Cohesion, Leadership, and Values: The Problem in Comparative Organizations," stresses the importance of understanding the problem in different kinds of organizations. Section Two, entitled "Synergy in a Unique Organization Under Stress: The Army Unit in Combat," introduces and defines our guiding theoretical concept—organizational synergy, which serves as a nesting ground for leadership, values, and cohesion. Section Three, "Determinants of Organizational Synergy," is the specification of variables that can be utilized to predict our major concept. Section Four, "Framework for Future Research," presents a plan for research. This final section specifies relevant literature, identifies concepts to be measured mathematically, and shows how they can be combined into one statistical model that can be estimated.

TR 771 Analysis of Soldier in Europe Survey Data: Final Report, Lockhart, D.C. December 1987. (AD A195 117) This report describes analyses performed on data collected by the U.S. Army Research Institute during a longitudinal survey of first-term soldiers in Europe. Preliminary analyses of the survey data focused on five constructs. Three of these are related to adaptation and two to cohesiveness. The three constructs related to adaptation include fit with the Army, career affiliations, and supervisor's ratings. The two cohesion-related constructs are vertical bonding and horizontal bonding.

TR 772 The Effect of Transferability of GI Bill Educational Benefits for Family Members on Army Retention and Career Choice, Lakhani, H.; Gade, P.A.; Nogami, G.Y. December 1987. (AD A191 694) This technical report analyzes the effect of proposed transferability of the new GI Bill benefits for family members of soldiers on their retention and career choice. The authors employ cost-effectiveness analysis to compare the increase in costs of the proposal and selective reenlistment bonuses to be paid to the reenlistees with the decrease in recruitment and training costs and conclude that the proposal is cost effective because the Army can save at least $9,400 per soldier. An estimated increase in reenlistment based on a survey of soldiers' intentions to reenlist suggests that the Army can save about $200 million per year.

TR 773 A Quantitative Model of the Considerations Determining Enlistment and Reenlistment Behavior, Rakoff, S.H.; Adelman, L.; Mandel, J.S. December 1987. (AD A192 029) This project was designed to improve the understanding and modeling of the

decisions, made each year by thousands of first-term soldiers, to reenlist in the Army or to leave for civilian jobs and school. A model of the reenlistment decision formulated from a decision-analytic perspective was developed, based on an extensive review of the literature in the areas of military personnel, job satisfaction and job change, and decision theory, as well as from focus groups conducted with first-term soldiers at Fort Benning, Georgia. A multicomponent decision-modeling approach incorporating attitudinal, normative, and affective predictors of reenlistment intent was then developed, along with a set of instruments to capture data on these components. A multimethod analysis plan, centered on measuring convergent and divergent validity, was formulated and then applied to data gathered from three pilot group sessions held at Fort Benning in April 1987. The method tested the ability of each of the three components, alone and in combinations, to correctly predict a soldier's intent to reenlist or leave the Army. Consistent with previous findings for an enlistment task, the analysis of the pilot test data indicated that the three components predicted reenlistment intent tin the following rank order: affect, attitudinal, and normative. The results also suggest that the Army has available tools for influencing these reenlistment decisions that are much more varied than the limited set of mainly economic factors that are now predominant in these programs. Specifically, the affective component dominated the economic variables in predicting reenlistment intent for this limited sample of soldiers, and may be an important reenlistment program and policy lever in the future.

TR 774 and 775 Canceled.

TR 776 Development and Field Test of Behaviorally Anchored Rating Scales for Nine MOS, Toquam, J.L.; McHenry, J.J.; Kemery, E.; Borman, W.C.; Mendel, R.; Bosshardt, M.J.; Corpe, V.A.; Lammlein, S.E.; Rose, S.R. January 1988. (AD A194 271) The research described in this report was performed under Project A, the U.S. Army's current, large-scale, manpower and personnel effort to improve the selection, classification, and utilization of Army enlisted personnel. This report documents the development and field test of behaviorally anchored rating scales for nine Military Occupational Specialties (MOS). These include combat, combat support, and noncombat MOS. For each MOS, the behavioral analysis method was used to generate examples of performance. These examples were used to identify performance effectiveness dimensions and to develop behavioral definitions of performance for each dimension. Across the nine MOS, behavioral summary rating scales contained from 7 to 13 performance dimensions. The nine sets of MOS-specific behavioral summary rating scales were field tested in continental United States and overseas locations in two groupings (Batch A and Batch B). For each MOS, ratings scales were administered to 120 to 160 first-term soldiers and their supervisors. Within each MOS, interrater reliability estimates for individual performance dimension ratings were reasonably high and rating distributions were acceptable, indicating no leniency or severity effects. Results from the field tests, along with suggestions from proponent review committees and Project A staff, were used to modify and prepare the nine sets of rating scales for the Concurrent Validation study.

TR 777 A Cognitive Model of Pedagogical Question Asking, Swartz, M.L. January 1988. (AD A194 139) Soldiers will be interacting more directly with high-technology, computer-based training systems in the Army of the future. Soldier trainees interacting with these machines will profit from the ability to ask questions as they learn. A fundamental

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problem we need to address is how to create computer-based tutorial dialogues that will allow soldiers training on these systems to ask questions easily and naturally. The first step toward creating interactive tutorial dialogues is to understand the cognitive role of pedagogical question asking in a computer-based learning environment. Questions asked during acquisition of a complex skill reflect the information military students require at different stages of learning. Evaluation of the kinds of questions asked in a particular MOS should provide information descriptive of each student's current knowledge state. Question analysis can be used for defining the goals, operators, and methods a student is using or needs at a given time during the instructional sequence. Mapping the questions asked at a particular point during the acquisition process onto the conceptual representation for the MOS will indicate what kind of knowledge is being processed by a student. As new material becomes learned and organized in the knowledge representation, patterns of knowledge should shift from one area of the representation to another. This report describes a cognitive model that addresses the problem of understanding the role of question asking in skill acquisition.

TR 778 Effects of Degraded Mode Gunnery Procedures on the Performance of M1 Tank Gunners, Witmer, B.G. January 1988 (AD A192 246) The Unit Conduct of Fire Trainer (UCOFT) was used to determine the effects of using degraded mode gunnery procedures on the performance of 48 M1 experienced noncommissioned officers. Using the Gunnery Index (Witmer, 1986) as the measure of proficiency, gunnery performances under three different degraded conditions were compared to performances under fully operational conditions. Results suggest that using degraded gunnery procedures adversely affects the performance of experienced armor crewmen, with the most dramatic performance decrements occurring when degraded conditions require the use of the Gunner's Auxiliary Sight (GAS). Performance did not improve significantly under degraded conditions after a brief period of degraded gunnery practice on the UCOFT, suggesting the need for specialized degraded gunnery training programs.

TR 779 Sales Training for Army Recruiter Success: Sales Strategies and Skills Used by Excellent U.S. Army Recruiters, Frieman, S.R. November 1987 (AD A193 712) This report describes a program of research on the communication strategies and skills used by excellent Army recruiters. Information to be used to generate more effective sales training programs for recruiters was obtained. A linguistic modeling procedure was developed and used to identify these communications strategies and skills. Transcripts of interviews of recruiters in the field, as well as observations, were analyzed for communication patterns and the belief and rule components of communication strategies.

This report is one in a series of four reports on "Sales Training for Army Recruiter Success." The four reports are identified as follows:

1. Technical Report 779, *Sales Training for Army Recruiter Success: Sales Strategies and Skills Used by Excellent U.S. Army Recruiters.*

2. Research Producer 87-37, *Sales Training for Army Recruiter Success: Interviews with Excellent Recruiters.*

3. Research Product 87-38, *Sales Training for Army Recruiter Success: Modeling the Sales Strategies and Skills of Excellent Recruiters.*

4. Technical Report 780, *Sales Training for Army Recruiter Success: Supplementary Information on Modeling the Sales Strategies and Skills of Excellent Recruiters.*

Technical Reports

TR 780 Sales Training for Army Recruiter Success: Supplementary Information on Modeling the Sales Strategies and Skills of Excellent Recruiters, Jacobson, S. November 1987. (AD A195 005) This report describes a program of research on communication strategies and skills used by excellent Army recruiters. Information to be used for the generation of more effective sales training programs for recruiters was obtained. A linguistic modeling procedure was developed and used to identify the communications strategies and skills. Recruiters were observed and interviewed in their field environment. Transcripts of the interviews were analyzed for communication patterns, as well as the belief and rule components of communication strategies. This report is one in a series of four reports on "Sales Training for Army Recruiter Success." The four reports are identified as follows:

1. Technical Report 779, *Sales Training for Army Recruiter Success: Sales Strategies and Skills used by Excellent U.S. Army Recruiters.*

2. Research Product 87-37, *Sales Training for Army Recruiter Success: Interviews with Excellent Recruiters.*

3. Research Product 87-38, *Sales Training for Army Recruiter Success: Modeling the Sales Strategies and Skills of Excellent Recruiters.*

4. Technical Report 780, *Sales Training for Army Recruiter Success: Supplementary Information on Modeling the Sales Strategies and Skills of Excellent Recruiters.*

TR 781 Retention Patterns for Army National Guard Units Attending the National Training Center, Grissmer, D.W.; Nogami, G.Y. April 1988. (AD A194 424) This report analyzes attrition patterns of Army National Guardsmen during their training and rotation at the National Training Center (NTC). It uses both a case study approach for seven units and statistical analysis of individual attrition to determine if attrition is higher for units attending NTC. It concludes that attrition is significantly higher for NTC units because of the effects of increased training time, which increase family and employer conflict and lost income from civilian jobs, and because of pruning of marginal personnel.

TR 782 Effectiveness of the Interactive Videodisc-Enhanced German Gateway Program, Ekstrom, A.; Goehring, D.J. March 1988. (AD A193 179) Integration of emerging instructional technologies into existing training programs has the goal of improving training while reducing costs. Evaluation of new systems in the context of the training program is the best method for determining if this goal is being achieved. The Defense Language Institute (DLI) developed an interactive videodisc (IVD) system for use in the German Gateway course. The Army Research Institute evaluated the IVD system in a field test. The objectives of the research were (1) to compare the effectiveness and acceptability of the video-enhanced German Gateway program with the existing German Gateway program and (2) to identify user issues in the adoption of the interactive video course materials. The research used a Baseline group of 49 students who participated in the existing course in 1984-5 and an IVD Field Test group of 40 students who took the video-enhanced course in 1986. Group comparability was assessed for demographic and German-language-experience measures. Students' German proficiency and attitudes about the course were compared. Language proficiency was measured both by self-report and by pairs of trained raters in an Oral Proficiency Examination. The two groups were comparable on precourse measures with the exception of time in Germany. (The IVD Field Test group had significantly more time in Germany.) Controlling for this factor, proficiency in German was greater for the IVD Field Test group. However, the final examina-

tion for the course was changed at the same time as the introduction into the course of the IVD materials and probably contributed to the effect. Listening comprehension of German was also better for the IVD Field Test group than for the Baseline group. The IVD materials were well received by both students and instructors, although there was some ambiguity about the role of the materials in the German Gateway course. The findings from this research have three different levels of use: (1) they can contribute to the future role the IVD materials developed for the DLI German Gateway course will have in that program, (2) they can provide insight into the use of IVD technology in language training, and (3) they can benefit the more general application of IVD technology to training.

**TR 783 Requirements for Device-Based Training and Testing Program for M1 Gun-
          nery: Volume 1. Rationale and Summary of Results**, Hoffman, R.G.; Morrison, J.E. March 1988 (AD A194 808) This report is concerned with several interrelated questions that have arisen because performance requirements and training device capabilities are both expanding. The project began with an analysis of the domain of gunnery stimulus conditions and behaviors. This analysis pulled together information from a variety of sources and organized it into a more comprehensive description of M1 gunnery procedural elements than available from any one existing source. The tactical gunnery domain is described by two lists: (a) a list of tank gunnery conditions and (b) a list of tank gunnery behaviors. These two lists are not independent, but contain intentional redundancies. That is, where conditions create qualitatively different gunnery behaviors (e.g., single target versus multiple targets), the behaviors are segregated as separate activities. On the other hand, some conditions (e.g., target cover and concealment) have more subtle effects (i.e., do not lead to different behaviors) and therefore do not show up as separate activities.

The gunnery domain description was used to define training objectives and to guide evaluations of the four gunnery devices for both training and testing. Devices included the Videodisc Interactive Gunnery Simulator (VIGS), the arcade-type TopGun device, the Unit Conduct-of-Fire Training (U-COFT), and the Simulated Networking (SIMNET) battle simulation system. Evaluations of device capabilities were based on the fidelity of stimulus and response representation, on instructional features, and on testing capabilities relevant to the gunnery domain. Of particular interest was the identification of potential sources of negative transfer for training and negative correlations between performance on the device and performance on the actual equipment as a testing activity. Over the entire domain, U-COFT provides a comprehensive and realistic simulation of gunnery conditions and actions. SIMNET can support training of much of the gunnery devices (VIGS and TopGun) provide adequate simulations of the conditions and actions related to precision gunnery from a stationary tank. Each of the devices had one or more characteristics that creates negative transfer. Therefore, on-tank experience at both the beginning and advanced stages of training is necessary for training and testing gunnery. The final process was to combine the evaluations with the training and testing objectives to produce a systematic strategy for training and testing gunnery skills.

**TR 784 The Army Communications Objectives Measurement System (ACOMS): An-
          nual Report, School Year 86/87**, Nieva, V.F.; Gaertner, G.H.; Elig, T.W.; Benedict, M.E. April 1988 (AD A196 607) This paper presents results on (a) trends in key indicators of Army advertising effectiveness; (b) the distinctive images of the Army, its components and

other services; habits of 16- to 24-year-old American youth; (e) exposure to Army advertising; (f) recall of Army advertising; (g) knowledge of Army offers and benefits; and (h) career-choice and enlistment behaviors of the youth market. Interviews reported in this paper were conducted from October 1986 through June 1987. Samples were drawn monthly by random digit dialing (RDD) procedures. The sample were weighted to the eligible U.S. population on a quarterly basis. Household screenings to identify eligible respondents were completed in 83.4% of sampled households. Interviews were then completed in 76.3% of eligible youth identified in the completed screenings. The combined response rate was 63.3%, yielding a total of 6,774 youth interviews.

The Army Communications Objectives Measurement System (ACOMS) survey is a multiyear telephone survey of a nationally representative sample of 16- to 24-year old American youth and their parents. The survey tracks changes in perceptions, attitudes, and behaviors relevant to Army advertising. Data are being collected continuously through the year, using computer-assisted telephone interviewing (CATI) technology. Random digit dialing, involving a modified Waksburg method, is being used to identify eligible respondents. The 30-minute interview asks youth about their responses to Army advertising, media habits, career plans, and various demographic characteristics. Parents of selected 16- to 20-year-old respondents, who meet certain eligibility requirements, are also being interviewed on parallel topics.

Other ACOMS-related reports are identified as follows:

Technical Reports 785, 786, and 787

Research Report 1473

Research Products 88-04, 88-05, 88-06, 88-07, and 88-08

Research Notes 88-17 and 88-18

TR 785 The Army Communications Objectives Measurement System (ACOMS): Survey Design, Nieva, V.F.; Elig, T.W. April 1988 (AD A197 517) This report is the first of two design reports that document the plans for the Army Communications Objectives Measurement System (ACOMS). This report discusses the major design elements of the ACOMS survey: sampling and weighting, questionnaires, and data collection and processing. It also presents the results of the formal pretest conducted before the start of actual data collection. The second design report, *The Army Communications Objectives Measurement System (ACOMS): Survey Analysis Plan* (ARI Technical Report 786), discusses the general plan to analyze youth and parent survey data and specific plans by topic: tracking responses of the youth audience over time; segmentations of the youth market; differentiation among Army, Army component, and civilian career alternatives; parental influence; and modeling the effects of Army advertising. The ACOMS survey is a multiyear telephone survey of a nationally representative sample of 16- to 24-year-old American youth and their parents. The survey tracks changes in perceptions, attitudes, and behaviors relevant to Army advertising. Data will be collected continuously through the year, using computer-assisted telephone interviewing (CATI) technology. Random digit dialing (RDD), involving a modified Waksberg method, will be used to identify eligible respondents. The 30-minute interview will ask youth about responses to Army advertising, media habits, career plans, and various demographic characteristics. Survey data will be analyzed separately, as well as in conjunction with other data being collected by the ACOMS system, and will be released on a quarterly basis.

Other ACOMS-related reports are identified as follows:

Technical Reports 784, 786, and 787

Research Report 1473
Research Products 88-04, 88-05, 88-06, 88-07, and 88-08
Research Notes 88-17 and 88-18

TR 786 The Army Communications Objectives Measurement System (ACOMS): Survey Analysis Plan, Gaertner, G.H.; Elig, T.W. May 1988 (AD A196 588) This is the second of two design reports that document the plans for the Army Communications Objectives Measurement System (ACOMS). This report discusses the general plan to analyze youth and parent survey data and specific plans by topic: tracking responses of the youth audience over time; segmentations of the youth market; differentiation among Army, Army component, and civilian career alternatives; parental influence; and modeling the effects of Army advertising. The first design report, the *Army Communications Objectives Measurement System (ACOMS): Survey Design* (ARI Technical Report 785), discusses the major design elements of the ACOMS survey: sampling and weighting, questionnaires, and data collection and processing. It also presents the results of the formal pretest conducted before the start of actual data collection. The ACOMS survey is a multiyear telephone survey of a nationally representative sample of 16- to 24-year-old American youth and their parents. The survey tracks changes in perceptions, attitudes, and behaviors relevant to Army advertising. Data are being collected continuously through the year, using computer-assisted telephone interviewing (CATI) technology. Random digit dialing (RDD), involving a modified Waksberg method, is being used to identify eligible respondents. The 30-minute interview asks youth about responses to Army advertising, media habits, career plans, and various demographic characteristics. Parents of selected 16- to 20-year-old respondents, who meet certain eligibility requirements, are also being interviewed on parallel topics. Survey data will be analyzed separately, as well as in conjunction with other data being collected by the ACOMS system.
Other ACOMS-related reports are identified as follows:
Technical Reports 784, 785, and 787
Research Report 1473
Research Products 88-04, 88-05, 88-06, 88-07, and 88-08
Research Notes 88-17 and 88-18

TR 787 The Army Communications Objective Measurement System (ACOMS): Survey Methods, Nieva, V.F.; Rhoads, M.D.; Elig, T.W. July 1988 (AD A199 441) This report, the final in a series that documents various aspects of the Army Communications Objectives Measurement System (ACOMS), discusses the methodology used in the implementation of the ACOMS survey, a multiyear telephone survey of a nationally representative sample of 16- to 24-year-old American youth and their parents. Data were collected continuously throughout the year, using computer-assisted-telephone-interviewing (CATI) technology.
The first chapter of this report presents an overview of the main elements of the ACOMS survey methodology: sampling and weighting, survey questionnaires, and data collection procedures. Each subsequent chapter presents further discussion of these topics. Chapter 2 discusses the characteristics of the various sample groups included in the survey, the sample selection procedures, the actual number of completed interviews for each major sample group, and the weighting procedures applied to the data. Chapter 3 describes the three survey instruments used: the household screening interview, the youth interview, and the parental interview. It also describes the major topics covered by each interview and the complex questionnaire

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structures implemented to accommodate the wide range of topics required b y the Army, along with concerns for limiting questionnaire length and respondent burden. Chapter 4 describes the CATI data collection procedures, including interviewer training and data collection monitoring. It also presents the results of various modifications in survey procedures implemented at various points in order to improve survey yields.

Other related reports are identified as follows:

Technical Reports (TR) 784, 785, and 786

Research Report (RR) 1473

Research Products (RP) 88-04, 88-05, 88-06, 88-07, and 88-08

Research Notes (RN) 88-17 and 88-18

TR 788 Design of Battle Simulations for Command and Staff Training, Solick, R.E.; Lussier, J.W. April 1988. (AD A196 655) This report summarizes findings from 10 years of research at the Army Research Institute Fort Leavenworth Field Unit on command and staff training with automated battle simulations. Topics include design issues related to training objectives, performance measurement, simulation requirements, user interfaces, and workload estimation. This assessment of lessons learned provides guidance to developers of the next generation of battle simulations.

TR 789 Validation of the Realistic Air Defense Engagement System (RADES), Drewfs, P.R.; Barber, A.V.; Johnson, D.M.; Frederickson, E.W. April 1988. (AD A198 289) This report describes the Realistic Air Defense Engagement System (RADES) and research performed to assess its validity. RADES is an air defense simulator consisting of subscale aircraft, an aircraft position/location system, air defense weapon systems, and an electronic interface that connects the weapon to a data collection and communication system. Short Range Air Defense (SHORAD) crews are brought to the RADES range; the weapon is connected to the interface, and the crew is given an operations order, alerted, and cued to the azimuth of the incoming aircraft. Data are automatically collected from the weapon and crew while they engage the RADES aircraft. Data were collected from four Chaparral crews and six Stinger teams during the spring of 1984. Data included times and ranges for critical engagement events, as well as aircraft identification accuracies and kill or miss data. Data from these tests were analyzed and compared both to theoretical predictions derived from a computer model that took as input known physical limitations of weapons, human reaction times, and the flight path of the aircraft and to performance data obtained in earlier full-scale studies reported in the air defense literature. In both cases the data obtained from RADES were consistent with the criteria established for empirical validity.

TR 790 The Army 2-Year Enlistment Option: Meas ring Its Cost-Effectiveness, Horne, D.K.; Pliske, R.M.; Gilroy, C.L. May 1988. (A   A197 081) Data from the U.S. Army Research Institute's Survey of Army Recruits was examined to assess the effectiveness of the 2-year enlistment tour. Cross-tabulation and cost-benefit analyses were conducted, indicating that in the 1986 sample of new Army recruits, more than one-half (54%) of the male, 2-year recruits would not have enlisted in any service without the 2-year option. Furthermore, this percentage was even larger for the higher AFQT category recruits, indicating that the 2-year option is particularly useful for attracting recruits from the highest AFQT categories. The substitution effect from the other services is relatively small. The 2-year option was also

found to be a valuable allocation tool that attracts recruits to MOS that would otherwise be difficult to fill. The cost-benefit analysis, taking into account training and differential attrition and retention rates across tours, indicates that the 2-year option is cost-effective and saves the Army nearly $178 million per year when compared with pay incentives.

TR 791 Factors Influencing Combat Stress Reactions and Post-Traumatic Stress Disorder: A Literature Review, Weaver, S.F.; Stewart, N.K. April 1988. (AD A198 063) This study reviews 91 articles dealing with Post-traumatic Stress Disorder (PTSD) or Combat Stress Reactions (CSR). The articles were classified into these four categories: psychological factors during the war, physical factors of the war, demographic variables, and post-war adjustment factors. A lengthy appendix analyzes each study and presents its conclusions. Relying on an extensive survey of the literature, this paper examines those specific variables thought to be causes of PTSD or CSR. Unfortunately, the research does not indicate strong support for most of these variables. Such divergent results indicate the need for more precise future research in the area.

TR 792 Improving the Selection, Classification, and Utilization of Army Enlisted Personnel: Annual Report, 1986 Fiscal Year, Campbell, J.P. May 1988. (AD A198 856) This report describes the research performed during the 4th year (FY86) of Project A, the Army's long-term program to develop a complete system for selecting and classifying all entry-level enlisted personnel. During the 4th year, the wide variety of predictor and criterion measures that had been developed and field tested during the first 3 years were administered to 9,500 soldiers in the Concurrent Validation phase of the project. This report describes the data collection and analysis for this phase, which is being followed by a Longitudinal Validation phase in which approximately 50,000 soldiers in 21 Military Occupational Specialties (MOS) will be tested on entry into the Army and during subsequent first-tour job performance. This report is supplemented by an ARI Research Note (in preparation), which contains a number of technical papers prepared during the year on specialized aspects of the project.

TR 793 Recruit Quality, Soldier Performance, and Job Assignment, Schinnar, A.P.; Wood, L.; Nord, R.D.; Schmitz, E.J.; Kaveroj, P.D. May 1988. (AD A197 082) A conceptual framework to link multiple measures of recruit performance and costs with job assignments was developed. Data envelopment analysis was used to construct an index of performance. Statistical analyses were then performed to examine the relationship of recruit characteristics to the performance index. Results were that enlistment test scores predicted performance, but education did not.

TR 794 Device-Based Gunnery Training and Transfer Between the Videodisk Gunnery Simulator (VIGS) and the Unit Conduct of Fire Trainer (UCOFT), Witmer, B.G. May 1988. (AD A197 769) The Videodisk Gunnery Simulator (VIGS) and the Unit Conduct of Fire Trainer (UCOFT) were used to cross-train soldiers from an M60A3 armor unit as M1 tank gunners. Estimates of measurement reliability were obtained for each device and the effectiveness of the devices for training gunnery skills was evaluated. Measures of effectiveness included performance improvement on each device as a function of practice on that device and training transfer between the devices. The results showed that gunnery performance could be reliably measured on both the VIGS and UCOFT. Significant improve-

ments in gunnery performance were obtained with both devices, but skills learned did not transfer from one device to the other.

TR 795 Computer-Mediated Group Processes in Distributed Command and Control Systems, Weisband, S.B.; Linville, J.M.; Liebhaber, M.J.; Obermayer, R.W.; Fallesen, J.J. June 1988. (AD A198 140) Carefully designed procedures for command and control (C2) staff operations are critical to realize effective direction and management of tactical forces. The survivability of command posts and the functions they serve are critical as well. With the increased use of battlefield automated systems, it will be easier to distribute Army C2 staffs and their functions in favor of increased survivability. In anticipation of greater computer-mediated communications and task procedures, this report considers group and human factors issues requiring study. Previous behavioral research findings on team and group processes, distributed communications, and computer-mediation are discussed. Characteristics of operations in a distributed, computer-mediated mode are projected for C2 staffs. Issues that may induce decrements or increments in performance are identified and recommended as experimental variables in human performance research.

TR 796 Rapid Decision Making on the Fire Ground, Klein, G.A.; Calderwood, R.; Clinton-Cirocco, A. June 1988. (AD A199 492) The objective of this study was to examine the way in which decisions are made by highly proficient personnel, under conditions of extreme time pressure, and where the consequences of the decisions could affect lives and property. The domain of fire fighting was selected, and the search focused on the decisions made by Fire Ground Commanders (FGCs) who are responsible for allocating personnel and resources at the scene of a fire. The method used included aspects of critical incident and protocol analysis paradigms. Interviews were conducted with 26 experienced fire fighters (mean amount of experience = 23 years). Each interview covered a critical incident that was nonroutine and demanded expertise. Most incidents had occurred within the year preceding the interview, which probed the incident decision points: options identified, options selected, and reasons for the choice. A total of 156 decision points were probed in this way. The major finding was that in less than 12% of the cases was there any evidence of simultaneous comparisons and relative evaluation of two or more options. In over 80% of the cases, the strategy was for the FGCs to use their experience to directly identify the situation as typical of a standard prototype, and to identify a course of action as typical for that prototype. In this way, the FGCs handled decision points without any need to consider more than one option. A Recognition Primed Decision (RPD) model was synthesized from these data, which emphasized the use of recognition rather than calculation or analysis for rapid decision making.

TR 797 A Multivariate Analysis of Determinants of Reenlistment: A Decision-Making Model for Enlisted Personnel, Smith, A.L., Jr. June 1988. (AD A199 083) The Army must ensure that retention efforts result in the reenlistment of enough qualified enlisted personnel to maintain force readiness. The purpose of this research was to identify factors that influence soldiers' reenlistment intentions and decisions. A comprehensive model of career decision making was developed and tested using path analysis. The findings indicate that the major determinant of reenlistment intent is organizational commitment, which in turn is influenced by tenure, satisfaction, and perceptions of unattainable needs and aspirations, civilian alternatives, MOS, and demographic and organizational variables on reenlist-

ment intent. Discussion addresses the relevance of the findings to retention policy and career counseling in the Army.

TR 798 Review of Command Group Training Meas rement Methods, Garlinger, D.K.; Fallesen, J.J. July 1988 (AD A201 753) This report documents a literature review of performance measurement for command group training, as well as providing a discussion of potential sources of performance data. Specific measurement techniques (i.e., self-assessment, peer assessment, ARTEP, probes, battle outcome data, etc.), which have been applied and reported in the literature, are analyzed against 10 performance measurement criteria. Of those measurement techniques analyzed, none favorably met all 10 of the established criteria. The analysis resulted in the determination that no one technique is acceptable in its present form for diagnosis and feedback in command group training, and that some combination of techniques, with refinements, will be needed. Several conclusions based upon the results are as follows:

a. External observers are to be preferred over peer- or self-assessment.

b. Probes can enhance training exercises as well as present situations for measurement of subsequent performance.

c. Information flow and other testing techniques rate better than observation or summarization techniques in terms of objectivity, accuracy, validity, and reliability.

Areas identified for further research and development include better assessment of measurement techniques, especially in terms of validity, reliability, and accuracy; refinement of measures for staff perceptions, information usage, and secondary task performance; various uses of automated simulation and data tracking techniques; and better understanding of staff performance.

TR 799 Knowledge Elicitation of Recognition-Primed Decision Making, Klein, G.A.; MacGregor, D. July 1988 (AD A199 076) A Critical Decision Method (CDM) has been developed for knowledge elicitation. The CDM, an extension of the critical incident technique, includes protocol analysis and memory recall tasks to study cognitive performance. A set of probes is employed to trace the development of situation assessment during critical incidents, and to determine the decision strategies used. The outputs of the method include inventories of the critical cues, graphic portrayals of the situation assessment process, and categorization of the decision strategies. Thus far, the method has been used with a variety of decisions and appears especially well suited to studying cognitive performance in naturalistic settings. It also appears valuable for addressing the highly skilled decision maker, and for eliciting the analytical and perceptual bases of proficient performance. Applications have been made for training, decision support systems, and the development and evaluation of knowledge-based systems.

TR 800 The Determinants of Satisfaction With Family Life: An Interdisciplinary Analysis of the U.S. Army, Lakhani, H. July 1988 (AD A200 691) This report analyzes the effect of economic, psychological, and sociological variables on soldiers' satisfaction with relationships with their spouses or children. It uses data from the Army Experience Survey, 1985. The results reveal that variables from all of the three disciplines play a role in determining satisfaction with family life in the Army. In particular, black and older soldiers

and soldiers with more children showed more satisfaction, and attritees showed less satisfaction with relationships with their spouses or children.

TR 801 The Effects of Work on Family Life: A Review and Analysis of the Literature, Teplitzky, M.L. July 1988. (AD A198 936) There are three major streams of research especially relevant to the examination of the interrelationships between work and family: research conducted within the spillover/compensation framework, literature on dual career couples, and research on the experience of work/family conflict, which is the most directly relevant and broadly applicable to the interests of the Army in this area. However, several conceptual and methodological weaknesses are apparent in this approach. Suggestions for enhancing the utility of the work/family conflict approach are presented, along with a preliminary conceptual framework for the investigation of the effects of work on family.

TR 802 An Overview of Hispanics in the Active Enlisted Army: 1980-1986, Verdugo, N.; Grafton, F.C. July 1988. (AD A199 494) The Hispanic youth population is rapidly growing relative to most other groups. In light of the overall declines in the size of the youth market, Hispanics become an increasingly important population to military recruiters. The authors have examined the representation of Hispanics in the Army, as well as their relative performance on the Armed Forces Qualification Test (AFQT), outcome of their first tour, and other characteristics. Results indicate that Hispanics make good soldiers and have very low attrition rates relative to other groups, yet they appear to be underrepresented in the Army compared to their distribution in the civilian population. However, there is strong evidence that official records underestimate the actual number of Hispanics in the Army. It is believed that the actual proportion of Hispanics in the Army is not much less than their proportion in the population. Dramatic declines in the proportion of Hispanics in the Army occurred after 1980, when the AFQT miscalibration was discovered. Recruitment of this group is complicated by their very high dropout rates from secondary school. For Insular Puerto Ricans, lack of fluency in English prevents many from accessing into the military. Relative to other groups, Hispanics are more likely to successfully complete the first tour, are more likely to reenlist, and are less likely to receive adverse discharges. Examination of the demographic characteristics of Hispanics indicate that they are a diverse group. This finding suggests that analysis is improved if each Hispanic ethnic group is analyzed individually.

TR 803 The Precedence of Global Features in the Perception of Map Symbols, Knapp, B.G. June 1988. (AD A203 792) This research investigated the role of global precedence in visual perceptual processing. Researchers evaluated the effect of global features on the speed and accuracy of detecting map symbols. The global precedence position suggests that perception proceeds temporarily, through stages, from the recognition of global features to a more local, fine-grained analysis of individual elements. The study was conducted to compare performance (speed and accuracy) in a symbol-alone condition with that in various symbol-plus-distractor conditions. Scaling techniques (Multidimensional Scaling Analysis and Hierarchical Cluster Analysis) were applied to an existing database of map symbols to categorize global (general) and local (detailed) features of the symbols. Following this, a detection task was performed to determine the level of interference in detecting target symbols of various global categories when distractor symbols were present. The response latency and accuracy measures from the detection study were analyzed using a one-way repeated measures

ANOVA, followed by a planned comparisons between target-distractor category means. The research shows that the response latency measure discriminates well among symbol-distractor conditions, but the accuracy measure does not. First analysis of the data did not reflect the impact of global precedence in all cases. Further analysis revealed that local feature similarity played a more prominent role in discriminating symbol groups than was originally suspected. It is clear that the global precedence concept is a useful one in describing symbol populations in existence as long as the a priori scaling procedures used are precise enough to derive the global features.

TR 804   Dual Army Career Couples: Factors Related to the Career Intentions of Men and Women, Teplitzky, M.L. July 1988. (AD A199 289) In 1985, surveys designed specifically to address the issues most relevant to dual Army career couples were administered to 149 officers and 405 enlisted personnel in dual Army career marriages. Using a series of multiple regression analyses, relationships between career intentions and a number of work, dual Army career, and family-related factors were assessed separately for men and women. Results indicated that for both men and women, family concerns (e.g., pregnancy, children, assignments) accounted for variance in career intentions over and above the effects of work-related variables (e.g., pay and benefits, Army satisfaction) traditionally associated with retention. However, even in regressions including time in service, enlisted/officer status, and work-related variables as well as the family concern items, only about one-third of the variance in career intentions was explained. The results suggest that additional factors not captured in the models tested here are salient in the career-decision process of dual Army career couples.

TR 805   Dual Army Career Officers: Job Attitudes and Career Intentions of Male and Female Officers, Teplitzky, M.L.; Thomas, S.A.; Nogami, G.Y. July 1988 (AD A199 071) In 1985, dual Army career officers (N = 149) from nine installations in the continental United States were surveyed. Consistent with data from prior research, female officers in dual Army career marriages are much less likely than male officers to have plans early in their careers to stay in the Army until retirement. Concerns about family separations, pregnancy, and childcare appear to be important factors in the career decisions of these couples. Almost half of the dual Army career women said they would leave the Army rather than face a lengthy (1 year or more) separation from their husbands. Furthermore, although only a minority of the sample expressed strong concerns about childcare and pregnancy, the interviews suggested that time constraints and finding high-quality, flexible childcare arrangements were especially problematic given the long hours and erratic work schedules of Army officers.

TR 806   Effects of Expertise and Cognitive Style on Information Use in Tactical Decision Making, Michel, R.R.; Riedel, S.L. June 1988 (AD A203 462) The objective of the research was to investigate the effects of individual differences in expertise and cognitive style on information use in a tactical decision making problem. Researchers also evaluated the effectiveness of decision making research involving automated information presentation and response recording. Expertise was varied by using eight lieutenant colones (instructors) and eight majors (students) as participants. Cognitive style was measured with an individually administered Embedded Figures Test. Participants were each given two tactical problems to solve involving the development of a concept of operation for an offensive and defensive mission. The information available to them was typical of that available at a division command

post except that it was presented by computer system. The system automatically recorded what information the subject viewed and how he used the information to construct his order. Results indicate (1) the instructors used less information than did the students and the information by instructors consisted of more summary information and less detailed information than the students; (2) there was no relationship between the Embedded Figures Test scores and the measures of information use; ((3) there was no significant effect of mission type on information use; (4) there was only a very general model pattern of information use across participants; and (5) participants generally felt that this was a valid method for tactical decision making research. Wide variability in information use among the participants suggests that decision support system design should be based on input from multiple users.

TR 807 The Relationship of Group Cohesion to Group Performance: A Research Integration Attempt, Oliver, L.W. July 1988. (AD A199 069) The Army's increasing interest in group cohesion has led to increased research effort in that area. This report describes an effort to integrate the cohesion-performance research that employed real world groups using a meta-analytic approach. Tukey's (1977) stem and leaf display was used to display the data. The median effect size (product-moment correlation coefficient) for the 14 codable studies was .36, and the unweighted mean r was .42. When study effect sizes were weighted by the number of groups involved, the mean became .32. Rosenthal and Rubin's (1982) Binomial Effect Size Display (BESD) demonstrated that a correlation of .32 increases success rate (high performance) from 34 percent to 66 percent when cohesion is increased from low (below median). Although these findings are problematical because of the very small number of codable studies, as well as the conceptual and methodological problems associated with the cohesion-performance research, higher levels of cohesion would seem to be very desirable for real world groups such as Army units.

TR 808 A Description and Evaluation of the Army Communicative Skills Program, Baker, L.A. July 1988. (AD A203 459) The Army Communicative Skills Program is a recent effort by the Army to improve the writing, speaking, and reading effectiveness of all personnel. This report describes the program, the writing standard it mandates, the programs of instruction it offers, and its precursor, the Army Writing Program. The report also evaluates the potential of the program and considers its relevance to the missions of the U.S. Army Research Institute.

TR 809 Canceled.

TR 810 Changes in Knowledge Representation with Increasing Expertise, Mutter, S.A.; Swartz, M.L.; Psotka, J.; Sneed, D.C.; Turner, J.O. September 1988. (AD A203 716) Today's Army is highly dependent upon computer technology. Computers with specially designed applications software or "command languages" are integral to recruiting and record keeping, education and training, and maintenance and use of complex weapon systems. Since command languages are used in a wide variety of Army jobs, most soldiers will require training for at least one command language at some point in their Army career. The development of effective training for command language use depends upon an understanding of how this type of skill is acquired. This paper reports on research efforts to determine how the structure and use of knowledge for a command language changes as a function of increasing expertise with

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the language. Lotus 1-2-3, a popular command language for spreadsheet construction, was chosen for investigation. Trainees first received a tutorial on Lotus 1-2-3. Their knowledge representations for Lotus commands and concepts were then mapped using the ordered tree technique (Reitman & Reuter, 1980), and their ability to use the language was assessed using spreadsheet construction and modification tasks. Afterwards, the trainees were required to use the command language to complete a relatively complex practical exercise. Their knowledge representations and ability to use the language were assessed a second time. The results showed that there were qualitative changes in trainee knowledge of the software as command language skills were acquired. Specifically, trainee knowledge representations became more like those of an expert across the two testing sessions. This evolution in knowledge was accompanied by an increase in ability to accurately accomplish certain spreadsheet tasks.

TR 811   The Effects of the Chemical Defense Ensemble and Extended Operations on Performance and Endurance of Combat Vehicle Crews, Headley, D.B.; Brecht-Clark, J.; Feng, T.D.; Whittenburg, J.A. September 1988. (AD B131 688) One important means of protection against the use of chemical agents is the NBC (Nuclear, Biological, and Chemical) ensemble. The ensemble consists of an overgarment, mask with hood, overboots, and gloves. This protection may have disadvantages if endurance is limited and performance on military tasks is decremented because of the heat-containing and bulky nature of the suit. An ongoing research program, called P2NBC2 (Physiological and Psychological Effects of NBC and Extended Operations on Combined Arms Crews) studied the ability of combat vehicle crews (tank, howitzer, and Bradley Infantry Fighting Vehicle) to perform and endure while in Mission Oriented Protective Posture (MOPP) gear under various temperature and battle-realistic scenarios. General findings include (1) times to perform certain military tasks (e.g., times to fire the first round of howitzer fire missions, inter-round intervals within missions) while wearing the MOPP 4 ensemble were increased, (2) hot or humid environmental conditions limited the endurance of tank and howitzer crews, and (3) adjusting operational regimen (e.g., interjecting rest and food breaks and suit changes into the scenario) had a positive effect on endurance under MOPP conditions.

TR 812   The Impact of Cohesion on Platoon Performance at the Joint Readiness Training Center (RTC), Siebold, G.L.; Kelly, D.R. October 1988. (AD A202 926) This report describes the relationships between measures of cohesion obtained on nine U.S. Army light infantry platoons at home station and the subsequent performance of those platoons at the Joint Readiness Training Center (JRTC). The JRTC performance was measured by observer/controllers using task evaluation and observation checklists and also by company commanders using summary ratings. When outlier cases were controlled, bonding among leaders, soldiers, and between leaders and their soldiers was strong and correlated significantly with platoon performance as measured by the observer/controllers. Correlations with company commander ratings were positive but not significant. The strongest correlations were between the types of bonding listed above and the "preparation" subtask of task performance. However, because of the limited number of platoons involved, replication is needed to confirm the results, and caution must be used in drawing conclusions.

TR 813   Canceled.

Technical Reports

TR 814 The Career Decision Survey: Modeling the Army Enlistment Decision, Wilson, M.J.; Perry, M.S. October 1988 (AD A203 870) This technical report documents results from the Career Decision Survey. This survey was developed as a theory-based instrument designed to validate an application of Fishbein and Ajzen's (1975) psychological theory of reasoned action. As applied to career choice, this theory hypothesizes a direct relationship between the beliefs youths have regarding a particular career choice and their attitude toward the career. This attitude, in turn, directly influences intention to pursue the career. In addition, the theory states that career intentions are strongly influenced by the opinions of significant social influencers (e.g., parents). Findings validate and support the adoption of this theory as a useful perspective for analyzing Army enlistment intentions. Using individual respondent beliefs and perceptions alone, this model explained between 46% and 61% of the observed variance in career choice intentions. That is, using a relatively small number of questions that asked youths about their beliefs and opinions and those of persons important to them, the models were able to very accurately predict career intentions.

TR 815 A Review and Annotated Bibliography of Training Performance Measurement and Assessment Literature, Mohs, B.; MacDiarmid, W.R.; Andrews, D.H. October 1988 (AD A207 258) The objective of this report is to provide a foundation for technical training performance measurement and assessment (PMA) research. This review was performed to support a specific research project that surveyed current methods of PMA in schools and units for six Military Occupational Specialties (MOS). The authors reviewed research efforts that address training PMA concerns. Of the many documents reviewed, 173 are presented in annotated format as an appendix to this report. The review reveals the lack of an integrated system for measuring and assessing training performance. Several specific problems were indicated by the review. There is an over-reliance on subjective measures of performance, and a shortage of valid, reliable quantitative performance measures of training strategies and training effectiveness. Researchers should investigate means for developing more empirical data, better analytic methods, and standardized measurement. Increased emphasis should be placed on the application of learning principles such as knowledge of results and retention of learning in designing PMA systems.

TR 816 Development of the Platoon Cohesion Index [PCI], Siebold, G.L.; Kelly, D.R. October 1988 (AD A205 478) This report describes the development and properties of the PCI, a questionnaire that measures cohesion in Army platoons. Cohesion is conceptualized in terms of horizontal, vertical, and organizational bonding. The PCI consists of 20 items that form 3 horizontal, 2 vertical, and 5 organizational bonding scales. Data were collected from 44 platoons of light and mechanized infantry from 2 posts. Analyses indicated moderate to high intra-scale, inter-scale, and scale-criterion correlations as well as predictive validity with platoon performance on field training exercises. The PCI is now available and is considered valid for use by company commanders and platoon leaders to assess cohesion in their platoons.

TR 817 Development of the Combat Platoon Cohesion Questionnaire, Siebold, G.L.; Kelly, D.R. October 1988 (AD A204 917) This report describes the development and properties of an in-depth measure of cohesion at the platoon level. The measure was generated as part of a wider project to develop procedures and technologies for small unit leaders to

improve the leadership, cohesion, and commitment in their platoons and companies. The instrument was based on a conceptualization of cohesion as three types of bonding. These were (horizontal) bonding among peers, (vertical) bonding between leaders and subordinates, and (organizational) bonding between all platoon members and their platoon and the Army. The Combat Platoon Cohesion Questionnaire (CPCQ) consists of 79 base items used to form 3 horizontal bonding scales, 2 vertical bonding scales, and 6 organizational bonding scales. Data were collected from 70 infantry platoons across 4 posts to determine the properties of the instrument. Analysis of the data showed the CPCQ, at the individual respondent level, to have high reliability coefficients and an underlying factor structure representative of the scales. At the platoon level, the data showed high intra-scale item correlations and moderate inter-scale correlations. The scales also correlated well with construct validity items and items representing constructs, such as soldier confidence and "will" from related research. While more work on validating the instrument with external measures and on refining item wording is desirable, the current version of the CPCQ appears to be a solid, serviceable, in-depth measure of cohesion at the platoon level.

TR 818 Estimating the Cost of the Army College Fund, Schmitz, E.J.; Dale, C.; Drisko, A.F. October 1988.(AD A207 205) This paper estimates the projected costs of the Army College Fund (ACF) program implemented on 1 July 1985. Estimates are based on analysis of program participants to date and on historical usage under the FY 1981-82 ACF program and the Vietnam-era GI Bill. The estimates indicate that future program costs are likely to be considerably below the present actuarial rates.

TR 819 Longitudinal Research Into Methods of Assessing Managerial Potential, Stamp, G.P. October 1988.(AD A204 878) This report describes research on the prediction of executive potential. An assessment technique, the Career Path Appreciation (CPA), was developed based on the logic of Jaques' Stratified Systems Theory. Lower and middle level managers were assessed and followed up over periods ranging from 4 to 13 years. Predictive validities ranged from 0.7 to 0.9, strongly suggesting that (a) development beyond the lower and middle levels of organization is heavily dependent on conceptual ability, and (b) individual development beyond lower and middle levels should focus strongly on enhancing conceptual skills, as opposed to knowledge-based instruction. These results strongly support the logic of Stratified Systems Theory.

TR 820 Proceedings of the Fifth Annual Workshop on Command and Control Decision Aiding, Riedel, S.L.; Drillings, M. September 1988. (AD B131 863) This report contains the proceedings of the Fifth Annual Workshop on Command and Control Decision Aiding, held 27-29 October 1987 in Kansas City, Missouri. Included are papers and/or view graphs of the 26 presentations made at the workshop, the round table discussion, and the keynote address, "U.S. Army Command and Control System: Master Plan and Status," by COL Lawrence J. Dacunto. Paper presentation topics included Modeling the Decision and Decision Maker, Requirements, Man-Machine Interface, Evaluation Tools and Techniques, Distributed Decision Making, and Artificial Intelligence and Expert Systems. The workshop was sponsored by the Joint Services Working Group on Decision Aiding, a sub-group of the Joint Directors of Laboratories Technology Panel on C3I and hosted by the U.S. Army Research Institute for the Behavioral and Social Sciences.

Technical Reports

TR 821 Modeling the Effects of Army Advertising, Howell, R.D.; Wilcox, J.B.; Wilkes, R.E. November 1988. (AD A207 289) This research was performed to develop and empirically examine a set of prototype behavioral models designed to measure the effects of Army advertising on the decision to enlist in the Army. Data were taken from the Army Communications Objectives Measurement System (ACOMS) project. Psychometric properties of each of the model's components were assessed and parameters of the overall models were estimated using covariance structural modeling. The potential benefits of this approach were examined and recommendations were made for development of future models.

TR 822 The Effect of Target Background and Aspect Angle on Performance of Stinger Teams in the Realistic Air Defense Engagement System (RADES), Johnson, D.M.; Barber, A.V.; Lockhart, J.M. September 1988 (AD A207 283) The Realistic Air Defense Engagement System (RADES) is a validated Forward Area Air Defense (FAAD) engagement simulation that has been used to test and train FAAD troops. Engagement performance data are collected from troops and weapons while they engage subscale jet and helicopter aircraft in a desert environment. The experiment measured the performance of 12 Stinger teams under conditions that varied the visual information available. Jet aircraft were flown in two different attack maneuvers (pop-up or lay-down) against two types of background (terrain or sky). Helicopters popped up from defilade in two different aspects (0 degrees or 90 degrees) against either a sky or terrain background. Aircraft were either friendly (U.S.) or hostile (Soviet Bloc) scale models. Performance varied with conditions, being better in conditions of pop-up maneuver, sky background, and 90-degree aspect. The greater the visual contrast between target and background and the greater the visual size of the target, the better was the engagement performance. Detection performance was also better when the search sector was effectively reduced by the presentation of multiple targets. RADES results were compared with results from other published field experiments, where appropriate, and demonstrated consistency with those results.

TR 823 Delayed Entry Program (DEP) Loss Behavior, Nelson, A. September 1988. (AD A205 400) Losses from the Delayed Entry Program are becoming an increasing problem. This research examines this problem from a macro and micro perspective. First, an aggregate time series model is specified and estimated to determine those factors affecting DEP loss trends. A microdata model that uses a binary logistic regression approach to examine individual characteristics, enlistment policies, and environmental conditions affecting the probability of DEP loss is then estimated. From this research, high-risk DEP loss groups can be identified.

TR 824 Career Decisions of Dual Career Couples: An Interdisciplinary Analysis of the U.S. Army, Lakhani, H.A. December 1988 (AD A206 983) This paper analyzes career decisions of dual career soldiers in the U.S. Army. A survey of these soldiers was conducted in 1985. The results of a probit model reveal that Army career intentions are related to the economic variables on family income and car payments, the psychological variables on career commitments, and the sociological variables on family happiness, spouses decision to stay, and family size.

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TR 825 Review of Research and Methodologies Relevant to Army Command and Control Performance Measurement, Crumley, L.M. January 1989 (AD A211 247) This report reviews research that has been conducted on division-, brigade-, and battalion-level command and control processes. Battalion-level research, which forms the largest part of the literature, is shown to have been motivated primarily by the need to evaluate battalion Army Training and Evaluation Programs (ARTEPs) and factors related to battalion battle simulation development. The literature on research and methodology development is also shown to address certain basic issues such as what constitutes command post effectiveness and how battle outcome measures relate to command group performance. Some attention is also given to problems associated with the conduct of research in this arena and the development of research, or applied, measurement processes.

TR 826 Canceled.

TR 827 Analysis of Life Cycle Contractor-Delivered Training for Military Aircrew and Aircraft Maintainers, Criswell, E.L.; Fineberg, M.L.; Peters, J.L.; Frederickson, E.W.; Hintze, C.J. January 1989 (AD A135 452) This effort was the first in-depth analysis of life cycle contractor-delivered training (LCCDT). The analysis includes: (1) a description of LCCDT, (2) cost and required personnel comparisons of government and contractor-delivered training, (3) development of concepts and criteria for evaluation of contractor proposals for life cycle training, and (4) recommendations for design of contract-delivered programs to obtain their maximum benefits. To make the findings directly useful to the LHX procurement, the analysis focuses on aircrew and aircraft maintenance training.

TR 828 Effects of Recoil on Rifle Marksmanship Simulator Performance, Evans, K.L. February 1989 (AD A206 984) To determine if the accurate reproduction of a rifle's recoil is a necessary feature of a rife marksmanship simulator, this research was conducted with 24 adult volunteers in a military research organization. Each research participant fired 12 shots at silhouette targets presented on the Multipurpose Arcade Combat Simulator (MACS), whose demilitarized M16A1 rifle was equipped with a five-stage solenoid recoil mechanism developed by Larson Lectronics, Inc. Six of these shots were fired with recoil and six were fired without recoil. In each recoil condition, three shots were fired from a supported firing without recoil. In each recoil condition, three shots were fired from a supported firing position and three were fired from an unsupported position. The presentation sequence of the recoil and firing position conditions was counterbalanced across firers. In terms of both movement before the shot and accuracy, marksmanship simulator performance was not found to differ significantly as a function of recoil. As expected, recoil resulted in significantly greater movement after the shot, because of the introduction of rifle movement by the recoil mechanism itself. Consistent with previous research in the areas of classical conditioning and simulator fidelity, these findings suggest that the accurate reproduction of recoil is unnecessary in rifle marksmanship simulation.

TR 829 Canceled.

TR 830 The Determinants of Job Satisfaction: A Multidisciplinary, Multivariate Analysis of the U.S. Army, Lakhani, H.A. February 1989 (AD A209 143) This report

analyzes the effect of economic, psychological, and sociological variables on job satisfaction in the Army and Reserve/National Guard units. It uses data from the Army Experience Survey, 1985. The results reveal that variables from all of the three disciplines play a role in determining job satisfaction in the Army and the Reserve/National Guard units.

TR 831 The Determinants of Attrition From the Army Selected Reserves, Dale, C.J. March 1989 (AD A207 981) This paper addresses concerns expressed by the Sixth Quadrennial Review of Military Compensation about the relatively high attrition rates that characterize the reserves. Data from the 1982 New Recruit Survey were matched with data from the Defense Manpower Data Center, and an econometric analysis was done to determine the principal characteristics of soldiers who attrited from the reserves between 1982 and 1987. Some of the results support the conventional wisdom: higher quality soldiers had lower attrition rates than lower quality soldiers. Other results were more surprising: about one third of reservists in 1982 listed unemployment as a major reason for enlisting, and they had higher-than-average attrition rates. Soldiers who said they planned to leave the Army had above-average attrition rates, but soldiers who said that they planned to stay in the Army after their initial enlistment had the same attrition rates as soldiers who said that they simply didn't know their future plans.

TR 832 Estimating the Army's Prime Recruiting Market, Verdugo, N.; Berliant, K.R. April 1989 (AD A210 850) The Army's prime recruiting market is defined as 17- to 21-year-old males who are high school diploma graduates (HSDG), score in the upper half of the Armed Forces Qualification Test (AFQT), and are physically and morally qualified for military service. These males are not institutionalized, are not in military service, have no prior service, and are not in college. (This is also referred to as the "high-quality" male population.) The male prime market is estimated to decline approximately 21% between 1985 and 1995, though the male youth population will decline only 12% during this period. These figures suggest increased difficulty for military recruiters. "High-quality" males will be in great demand by the military, employers, and colleges in the years ahead.

TR 833 Measurement and Evaluation of Military Intelligence Performance, Thompson, J.; Landee-Thompson, B.; Fichtl, T.; Adelman, L. April 1989 (AD A210 690) The report describes the first phase of a 3-year research effort to develop a method for measuring the effectiveness of military intelligence (MI). Although the Army uses a number of evaluation methods, there are no methods appropriate for assessing the effectiveness of specific MI tasks and processes. To develop appropriate methods, researchers collected data through interviews and multi-attribute utility assessment and developed profiles of effective MI outputs. The profiles from the basis for a measurement instrument. In the next phase of research, a fault diagnosis methodology will be developed to trace failures in the outcome to causes in the MI process. In the final phase, the methodologies will be validated. A supplemental report (Working Paper HUA 88-03) describes the project rationale and additional results of interest to the military community.

TR 834 A Simulation-Based Evaluation of a Position Navigation System for Armor: Soldier Performance, Training, and Functional Requirements, Du Bois, R.S.; Smith, P.G. April 1989 (AD A210 696) The Army is investigating the utility of including an

automated Position Navigation (POSNAV) system in the Block II M1A1 tank. Researchers evaluated a prototype POSNAV system by assessing the simulation-based performance of 15 Armor platoons and 60 tank crews in two different display formats. The research compared the performance of crews and platoons using either a POSNAV grid or terrain map display with the performance of crews and platoons using conventional navigational tools, including a paper map, compass, and protractor. Findings strongly support including a POSNAV display in future tank upgrades Armor crews and platoons equipped with POSNAV performed significantly better than crews and platoons using conventional navigational techniques. POSNAV-equipped crews and platoons completed marches and combat missions more quickly, used less fuel, and reported checkpoints and enemy and own-tank locations faster and more accurately than crews and platoons using conventional tools. Few significant performance differences were detected between the POSNAV grid and terrain map display conditions. POSNAV issues addressed in this report include soldier performance and training implications, user acceptance, functional requirements, and potential combat, combat service, and combat service support effects.

TR 835 An Evaluation of the Aviation Resource Management Survey (ARMS) Checklist: Volume I, Ruffner, J.W.; McAnulty, D.M. May 1989 (AD A210 990) The Army helps Reserve Component training managers conduct training efficiently with visits by an Aviation Resource Management Survey (ARMS) evaluation team. This research was performed to assist the First U.S. Army Deputy Chief of Staff for Training in evaluating and revising the First Army ARMS Checklist. Aviation personnel from First Army National Guard and U.S. Army Reserve aviation support facilities and aviation units rated the Detectability, Importance, and Criticality of the checklist items, deficiencies that may result in aviation support or aviation unit failure, as applied to a facility and to a unit. The results indicate that, on the average, the Detectability and Importance of the items were rated moderate to high, while the Criticality was rated low. The rating distributions and the verbal scale anchors suggest that different criteria may be appropriate for determining if an item is low or high on each of the three scales. A procedure for using the Detectability, Importance, and Criticality information for revising the ARMS Checklist was developed. Recommendations are provided for improving the checklist content and the evaluation procedures. In addition, an ARMS Checklist data base was developed to help Army managers organize, interpret, and summarize the results of ARMS visits.

TR 836 Application of Computers To Learning in the Command and General Staff College: Analysis of Staff Officer Knowledge, Skills, and Abilities, Sandoval, R.R. May 1989 (AD A210 991) A front-end analysis regarding the expansion of the use of computers in instruction at the United States Army Command and General Staff College (CGSC) was conducted. U.S. Army field grade officers serving in command and staff positions gain the needed knowledge, skills, and abilities (KSA) by serving in a variety of assignments before they assume those positions. Formal schooling is included. While an officially compiled list of required qualifications for the positions does not exist, they can be inferred from the duties and responsibilities of the incumbents as defined in Army doctrinal publications. The inferences made for the CGSC front-end analysis are reported here. Resulting data are analyzed for significant features and relevance to the use of computers both performing necessary functions and for teaching needed KSA. This report presents the findings and

conclusions of Task B. Other reports are separately bound. The reports all have the same beginning title. The follow-on headings for the other reports are as follows:

A Front End Analysis Study

CGSC Analysis

Assessment of Computers in Education at Various Institutions

Technology Assessment

Assessment of Computer Literacy in CGSC

Analysis of Institutional and Financial Constraints

Army Command and Control Concepts Study

Comparison of Knowledge, Skills, and Abilities to CGSC Learning Objectives

Identification of Computer Opportunities

TR 837 Description and Prediction of Grafenwoehr M1 Tank Table VIII Performance, Hoffman, R.G. May 1989 (AD B136 331) This study was done for three reasons: to provide a description of the distributions of Table VIII performance scores, to gain insight into the structure of performance on Table VIII by exploring performance relationships among separate engagements and targets in Table VIII, and to partially replicate the research examining the relationship of experience, cognitive ability, and crew performance. The distributions of Table VIII performance scores show both ceiling and floor effects. That is, the distributions are truncated at both ends. Also, based on day versus night and moving versus stationary portions, performance on Table VIII appears to be very heterogeneous. We cannot predict how well a crew will perform relative to other crews, but we can predict how well a crew will perform an engagement relative to other engagements. For example, night targets are easier to hit quickly at short ranges, while day targets are easier to hit quickly at long ranges. This study led to two major conclusions regarding the prediction of Table VIII crew performance from individual crew members' ability and experience. First, the experience of both tank commanders and gunners shows a curvilinear relationship to crew performance. Second, the cognitive ability of the gunnery (assessed by AFQT or the Combat composite) has a linear association with crew performance that is independent of experience. Regardless of experience, crews with higher ability gunners perform better than with crews with less ability.

TR 838 Weighting Criterion Components To Develop Composite Measures of Job Performance, Sadacca, R.; Campbell, J.P.; White, L.A.; DiFazio, A.S. May 1989 (AD A210 357) Project A is the Army's long-term program to develop a complete personnel system for selecting and classifying all entry-level Army enlisted personnel. During the Concurrent Validation phase, a wide variety of predictor and criterion measures were administered to 9,500 soldiers in various military occupational specialties (MOS). These data were used to refine a model of job performance for entry-level personnel in terms of five basic components MOS-specific technical skills, general soldiering skills, effort and leadership, personal discipline, and military fitness and bearing. This report describes efforts to develop from these components a composite index of performance to use in determining the validity of the Trial Battery measures for each job. Experiments were conducted to determine the best method(s) of weighting the basic components for an overall composite index; weighting judgments were then gathered from a sample (totaling 712) of officers and noncommissioned officers (NCOs) familiar with each Project A MOS. Analysis of these data showed that both scaling methods tested (direct estimation and conjoint paired-comparison) produced highly reliable construct

weights, with the conjoint method slightly favored. There was relatively high agreement, although sometimes different emphasis, between the officer and NCO judging groups.

TR 839 Assessing the Utility of MOS Performance Levels in Army Enlisted Occupations, Sadacca, R.; White, L.A.; Campbell, J.P.; DiFazio, A.S.; Schultz, S.R. May 1989 (AD A211 608) Project A is the Army's long-term program to develop a complete personnel system for selecting and classifying all entry-level enlisted personnel. The utility measurement component deals with determining the relative utility to the Army of different levels of performance in entry-level Military Occupational Specialties (MOS). Because little research has been performed on such questions, exploratory work has done in a series of workshops with Army officers on how performance levels should be defined, what unit of measurement is appropriate for describing the relative value of differential job assignments across various MOS/performance level combinations, and how such values can best be estimated. Two scaling methods (pile placement and direct estimation) were selected and used to estimate utility values for 273 entry-level MOS. The research established that a coherent, reliable set of relative utility values can be derived at all performance levels for a wide variety of MOS.

TR 840 A Review of Procedures for Setting Job Performance Standards, Pulakos, E.; Wise, L.; Arabian, J.; Heon, S.; Delaplane, S.K. May 1989 (AD A210 717) This report summarizes recent literature on setting job performance standards. Major topics include (a) Army uses of job performance standards, (b) alternative judgement paradigms, (c) factors affecting the judgment process. (d) combining multiple standards, and (e) linking performance standards to selection test scores. A model of the standard setting process is also included. The report concludes with recommendations for further research

TR 841 Application of Key Position Analysis to the Advanced Field Artillery System (AFAS), Klaus, D.J.; Niernberger, K.J.; Maisano, R.E. June 1989 (AD A211 341) This project applied the key Position Analysis (KPA) methodology to the position of chief of section for the Advanced Field Artillery System (AFAS). The goal was to determine if new aptitudes or skills will be required by the section chief because of the changing role of that position in the AFAS. A series of scenarios were developed to establish the responsibilities required of the section chief during operations of the system under the dispersed battlefield concept. Appropriate responses were developed for each scenario from Army Training and Evaluation Program (ARTEP) tasks and other sources. Knowledge, skill, ability, and physical (KSAP) requirements were specified based on Military Occupational Specialty (MOS) requirements for soldiers who now perform those or similar tasks. The requirements were analyzed to recommend the appropriate MOS and grade level for the AFAS section chief. The recommendation was that the same MOS and grade currently assigned to section chief of the M109A2/A3 Self-propelled Howitzer, 13B30, be assigned to the Section Chief of the AFAS. However, the persons in this position will require training in tactical leadership and decision making. These skills are taught in the Advanced Noncom-missioned Officers Course (ANCOC), usually attended after the 13B30 has become a section chief and should be moved from ANCOC to BNCOC (Basic Noncommissioned Officers Course), which is usually attended before a 13B becomes a section chief. The issue of the availability of sufficient numbers of soldiers promotable to section chief is also discussed.

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TR 842 Computer-Mediated Group Processes in Distributed Command and Control Systems: Dyad Shared Work, Linville, J.M.; Liebhaber, M.J.; Obermayer, A.H.; Fallesen, J.J. June 1989 (AD A211 337) This report describes research and findings on the efforts of computer-mediated communications on distributed command and control. To support collaboration among distributed remote command staffs, computer-mediated communications may be needed to share information, provide supervision,coordinate operations perform analyses, and provide recommendations. This may require computer aiding, shared graphics, shared data bases, and two-way graphic communication. To test the potential of computer-mediated communication, an experiment was conducted that required two people to collaborate on a tactical movement order task. Both people were also required to perform other work to simulate conditions typical for command staffs. Measures were taken on the performance of primary and other work and of features on the communication transcripts. Work was performed face-to-face (FTF) and with the two people separated using various modes of computer-mediated communications. Of interest were voice or voiceless communications and synchronous or asynchronous communications. The following experimental modes were selected: (1) face-to-face (FTF), (2) synchronous with voice communications (SYNCH+V), (3) synchronous without voice communications but with the exchange of typed computer messages (SYNCH-V), and (4) voiceless asynchronous electronic-mail communications (ASYNCH). This experiment studied the effects of communication modes on task performance. A priori comparisons of the FTF mode and the other three modes were performed. The difference between FTF and SYNCH+V conditions were negligible. Results indicate that little is lost in terms of performance quality or speed when moving from face-to-face to computer-mediated communications with an auxiliary voice channel. There were notable time differences from these two modes to SYNCH-V and ASYNCH modes. Combat developers of command and control systems should consider computer-mediation as a viable alternative to face-to-face and voice-only communications.

TR 843 HARDMAN II Analysis Applied to the Forward Area Air Defense (FAAD) Pedestal-Mounted Stinger, Stewart, J.E. II; Shvern, U. June 1989 (AD A211 217) The Manned Systems Group of the U.S. Army Research Institute is responsible for developing analytical methods that support the Army's MANPRINT (Manpower and Personnel Integration) initiative. This report addresses the trial application of one of these methods, an automated derivative of HARDMAN (Hardware vs. Manpower) analysis called HARDMAN II, to the Army's Pedestal Mounted Stinger (PMS), a component of the Forward Area Air Defense (FAAD) system. The HARDMAN II analysis team had two objectives: to pilot test the analytical technique in a situation where critical input data are severely limited, and to demonstrate to proponents in the systems acquisition process the usefulness of HARDMAN II in generating workload-driven maintenance manpower estimates for a new weapon system. Both objectives were accomplished.

TR 844 Fire Fighting as Extended Operations: The Yellowstone Experience, Headley, D.B. June 1989 (AD A212 672) Active duty soldiers provided direct fire line support for the Yellowstone National Park fires of 1988. The mission provided a data collection opportunity to determine if noncombat scenarios could provide information on stress and performance in extended operations. A 45-item questionnaire was developed and administered to 1,000 soldiers who were on site at Yellowstone or who had returned to their home station.

The focus of the question was performance and stamina for physical work in this unique environment. Most of the respondents rated their line duties as more taxing than those in field training exercises. Sixty percent felt their ability to engage in continuously long, physically demanding workdays decreased over time; the median point of perceived decline in capability was estimated at 5 days. Other factors identified as having an influence on performance were perceived importance of duties, a lack of organization, and unclear expectations concerning the length of the mission. Response patterns were affected by rank of the respondents. Some responses differed as a function of location of questionnaire administration. Data from this kind of mission appear to be useful for application to extended operations. The similarities are the stressful nature, physical demands, and the "quick reaction" status that mimic true deployment. The potential also exists for gathering information on the influences of leadership, rank, and other aspects of the scenario that affect morale and motivation, and hence, performance and endurance.

TR 845 Army Synthetic Validity Project: Report of Phase I Results, Wise, L.L. (ed.); Arabian, J. (ed.); Chia, W.J. (ed.); Szenas, P.L. (ed.). June 1989. (AD A219 926) The two major objectives of the Army Synthetic Validity (SYNVAL) Project are (1) to identify and evaluate an optimal composite of selection measures for any Army enlisted MOS and estimate the validity of this composite for predicting job performance and (2) to develop and refine a procedure for setting a minimum qualifying score to assure a reasonable probability of successful job performance, as well as other appropriate cutting scores for other critical selection decisions (e.g., for selecting recruits with potential for outstanding performance). Synthetic validation approaches typically begin with the identification of a set of job components that can be used to describe the population of jobs being studied. A prediction equation is derived for linking available selection tests to each component. Subject matter experts (SMEs) are asked to identify the importance of each component to overall job performance. Finally, the prediction equations for the various components are weighted according to the judgment weights and summed to obtain an equation for predicting overall performance for the job. The Synthetic Validity Project is charged with developing procedures for specifying minimum qualifying scores and other appropriate cut scores on the predictor composites identified for each job. Procedures will be developed for identifying job performance standards for each job. These performance standards will then be linked to scores on the predictor composite for that job. There are three phases in the SYNVAL Project. Phase I was recently completed. For synthetic validation, the completion of Phase I represents a major accomplishment—development of a set of procedures for deriving synthetic equations that will predict performance for a small set of jobs. This set of procedures will obtain criticality ratings on job components, link predictors to job components, and combine that information to obtain prediction equations for three jobs. The SYNVAL standard setting research is designed to commence after job component models are adequately established. Therefore, for Phase I, we investigated three methods for describing performance standards at the job component level and one method for combining component standards into an overall standard.

TR 846 Canceled.

TR 847 The Application of Computers To Learning in the Command and General Staff College: Identification of Computer Opportunities, Sandoval, R.R.;

Technical Reports

Thorn, C.T.; Trainor, M.S. June 1989 (AD A212 716) A front-end analysis was conducted regarding the expansion of the use of computers in instruction at the U.S. Army Command and General Staff College (CGSC). Instruction at the CGSC is aimed principally at small groups of students. The underlying teaching philosophy emphasizes the students' responsibility to apply in classroom interactions, concepts, and procedures learned earlier in individual study. This instructional strategy readily lends itself to applications of computers to learning (ACL) from each of the categories used by the project team. However, introduction of many computer applications into college classrooms would need to take place over a period of years, depending upon how quickly the needed computers can be acquired and the appropriate software written. This report suggests appropriate ACL for each subcourse of selected course taught at the CGSC and how much of each subcourse might eventually be taught by using those applications. This report presents the findings and recommendations of Task G of the Front-end Analysis. Other reports are separately bound. The reports all have the beginning title, The Application of Computers to Learning in the Command and General Staff College. The follow-on headings for the reports are as follows:

A Front-End Analysis Study
CGSC Analysis
Analysis of Staff Officer Knowledge, Skills, and Abilities
Assessment of Computers in Education at Various Institutions
Technology Assessment
Assessment of Computer Literacy in CGSC
Analysis of Institutional and Financial Constraints
Army Command and Control Concepts Study
Comparison of Knowledge, Skills, and Abilities to CGSC Learning Objectives

TR 848 An Evaluation of the Aviation Resource Management Survey (ARMS) Checklist Volume II: Appendix C (ARMS Checklist Data Base), Ruffner, J.W.; McAnulty, D.M. June 1989 (AD A212 320) One of the ways that the Army helps Reserve Component training managers conduct training efficiently through Aviation Resource Management Survey (ARMS) evaluation team visits. The research reported in this document was performed to help the First U.S. Army Deputy Chief of Staff for Training evaluate and revise the First Army ARMS Checklist. Aviation personnel from First Army National Guard and U.S. Army Reserve aviation support facilities and aviation units rated the Detectability, Importance, and Criticality of the items contained in the ARMS Checklist as applied to a facility and to a unit. The results indicate that, on the average, the Detectability and Importance of the deficiencies described in the checklist items were rated as moderate to high, while the Criticality was rated as low. The rating distribution and the verbal scale anchors suggest that different criteria may be appropriate for determining if an item is low or high on each of the three scales. A procedure for using the Detectability, Importance, and Criticality information for revising the ARMS Checklist was developed. Recommendations are provided for improving both the checklist content and the evaluation procedures. In addition, an ARMS Checklist data base was developed to help Army managers organize, interpret, and summarize the results of ARMS visits.

TR 849 MANPRINT Methods Monograph: Aiding the Development of Manpower-Based System Evaluation, Kaplan, J.D. (ed.).; Archer, R.; Laughery, R.; Dahl, S.;

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O'Brien, L.; Criswell, E.; Faust, D.; Smith, M.; Walker, L.K.; Johnson, C.D.; Payne, D.L.; Asiala, C.F.. June 1989 (AD A213 484) The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) is conducting a program to develop methods to successfully integrate available operations and maintenance personnel with weapon system hardware and software during the MANPRINT process. This monograph consists of three papers that describe alternative ways to determine the operations and maintenance manpower required by a weapon system design on a per system basis.

TR 850 MANPRINT Methods Monograph: Aiding the Development of Training Constraints, Roth, J.T.; Warm, R.E.; Peters, J.; O'Brien, L.; Hawley, J.K.; Pence, E.C.; Robinson, R.E.; Masterson, S.; Criswell, E.L.. June 1989 (AD A215 636) The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) is conducting a program to develop methods to aid in sucessfully integrating available operations and maintenance personnel with hardware and software as part of the general MANPRINT process. This monograph consists of three concept papers. These papers describe alternative concepts for aiding the process of predicting probable weapon system training to constrain the design of that weapon system.

TR 851 Operator Workload: Comprehensive Review and Evaluation of Operator Workload Methodologies, Lysaght, R.J.; Hill, S.G.; Dick, A.O.; Plamondon, B.D.; Linton, P.M.; Wierwille, W.W.. June 1989 (AD A212 879) This report documents the results of an analysis of the scientific literature on operator workload. It begins with an extensive discussion of the concept and definitions of operator workload. The main body of the report is a review and analysis of techniques that have been used for assessing operator workload. These techniques are classified into two broad categories: (a) analytical or predictive techniques that may be applied early in system design, and (b) empirical or evaluative techniques that must be obtained with an operator-in-the-loop during simulator, prototype, or system evaluations. Information from the review provides practical guidance for selecting the most appropriate techniques for various system and resource characteristics.

TR 852 MANPRINT Methods Monograph: Aiding the Development of Manned System Performance Criteria, Kaplan, J.D. (ed.).; O'Brien, L.; Dahl, S.; Laughery, R.; Archer, R.; Connelly, E.; Conroy, J. III; Cherry, W.P.; Thompson, D.; Proegler, L.; Roerty, D.; Roberts, D.. June 1989 (AD A213 543) The U.S. Army Research Institute (ARI) is conducting a program to develop methods to successfully integrate available operations and maintenance personnel with weapon system hardware and software. This monograph consists of three papers that describe alternate concepts for the development of rigorous operations and maintenance performance criteria on a per system basis.

TR 853 Unassigned.

TR 854 An Evaluation of Four Alternative Orientation Indicators To Accompany the Tank Commander's Independent Thermal Viewer, Fisicaro, S.A. July 1989 (AD A212 788) This research evaluated four orientation indicators (icons) under consideration for the Commander's Independent Thermal Viewer (CITV). Each icon consisted of three parts: Hull, CITV, and Main Gun. They differed with respect to moving versus stationary parts: (a)

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Hull stationary with moving CITV and Main Gun, (b) Main Gun stationary with moving Hull and CITV, (c) CITV stationary with moving Hull and Main Gun, and (d) all moving parts. Forty-four M1-qualified tank crewmen were tested as tank commanders with a Unit Conduct of Fire (UCOFT) equipped with a prototype CITV. Results of analyses on performance measures and confidence ratings favored the all moving and Hull stationary icons over the CITV and Main Gun stationary icons and, with one exception, the all moving icon over the Hull stationary icon. In addition, results of analyses on a performance measure indicated that the soldiers preferred the all moving and Hull stationary icons over the CITV and Main Gun stationary icons, but had no clear preference for either the all moving icon or the Hull stationary icon. Finally, over 40% of the soldiers recommended including a cardinal direction indicator with the icon.

TR 855 Tank Driving Commands Preferred by Armor Noncommissioned Officers, Bessemer, D.W. July 1989 (AD A212 797) For this report, researchers surveyed armor noncommissioned officers (NCOs) experienced as tank commanders (TCs) and driving instructors to identify preferred TC commands and driver actions. The results showed consistent preferences for specific commands to control forward movement, but less agreement for pivot and reverse turn commands. One finding suggested that pivot turn commands used with M60-series tanks may be transferred improperly to M1 tanks. Twelve commands were recommended for universal standard use in driver training, and 15 other commands were considered suitable for optional use in more advanced unit training and in standard operating procedures. Most NCOs favored using some standard tank driving commands, agreeing that teamwork between the driver and TC will be increased, thereby reducing driver errors. A majority of the NCOs also agreed that driver training will take more time but that training will be easier to conduct. About 20% of the NCOs were not in favor of adopting standard commands.

TR 856 Family Adaptation to Relocation: An Empirical Analysis of Family Stressors, Adaptive Resources, and Sense of Coherence, Bowen, G.L. July 1989 (AD A212 805) This research supports the Army Family Action Plan by investigating ways to improve "family wellness" during a critical period of family stress—the adaptation to relocation overseas. The report is based on a secondary analysis of the "1000 Army Families Dataset," which was collected in 1983. Compared with earlier analyses of this dataset, additional concepts were specified to determine their relative influence on family adaptation and separate analyses were conducted for: (a) enlisted members, (b) spouses of enlisted members, (c) officers, and (d) spouses of officers. Although the results of the investigation are not directly comparable across the four sample subgroups, the findings clearly support the importance of congruency of expectations and actual experiences about life in Europe on the level of family adaptation. This factor emerged as the best predictor of family adaptation for all four subgroups. Specifically, family adaptation was highest in families where the actual experiences (e.g., the job, housing, and schools), were the same or better than expected before arrival in Europe. In addition, the level of community support (e.g., the extent to which individuals in the community can be relied on in times of trouble and the extent to which the community is perceived as a good place in which to live and raise children) also emerged as an important predictor of family adaptation for each of the subgroups. For all subgroups, the greater the community support, the higher the level of adaptation. Additional variables predictive of the family adaptation for

selected subgroups included recent and post-move events. For enlisted soldiers and their spouses, satisfaction with housing emerged as a significant predictor; for officers and their spouses, the ability to plan for military assignments and to have some say over the timing and location of assignments was positively associated with level of family adaptation. The findings strongly suggest that the Army can enhance family adaptation to USAREUR with a number of specific actions. The greatest increase in adaptation level can be achieved by enabling families to get accurate information about where they are going. This could be accomplished through better orientation programs, training of family "sponsors," and relocation literature. Adaptation can also be increased with improvements in informal community networks. This could be accomplished through leaders in the soldiers' units or through the family service providers at the soldiers' installations. Relocation stress can also be reduced by giving soldiers adequate time to handle personal and family affairs before they assume a demanding work schedule. This (also recommended by WRAIR based on their research) should reduce the "pile up of stressors" that add to the "normal" stressors inherent in any relocation. Finally, the Army should examine its practices that cause undue competition between the Army and the family for the soldier's time, energy, and commitment. This research indicates that this competition is particularly hard on the adaptation of the spouses of officers. Therefore, its reduction may well pay dividends, not only for the families, but for the effective functioning of the units that these officers lead. All of these recommendations have been provided to our sponsor, the U.S. Army Community and Family Support Center, through briefings and earlier draft reports.

TR 857 Canceled.

TR 858 Human Factors Research in Aircrew Performance and Training: 1988 Annual Summary Report, McAnulty, M.D. (ed.).; Aldrich, T.B. (ed.). August 1989 (AD A213 285) This report presents summaries of the research projects performed by Anacapa Sciences, Inc., for the ARI Aviation R&D Activity (ARIARDA) at Fort Rucker, Alabama. From 9 October 1987 to 8 October 1988, Anacapa personnel worked on 25 research projects and took part in 6 technical advisory services that address emerging aviation weapon systems design, manpower and personnel programs, and aviator training research. The summary for each project and technical advisory service contains (a) a background section that describes the rationale for the project and specifies the research objectives, (b) a research approach section that describes the tasks and activities required to meet the project objectives, (c) a results section that describes the research findings or, in the case of developmental activities, the research products, and (d) a project status section that describes the work completed and projections for future research, if any.

TR 859 Development of a Unit-Conduct of Fire Trainer (U-COFT) Test of M1 Gunnery Proficiency, Hoffman, R.G.; Witmer, B.G. August 1989 (AD A219 045) A test of M1 gunnery proficiency based on content analysis of Tank Table VIII engagement parameters was prepared for the Unit-Conduct of Fire Trainer (U-COFT). The test is composed of four U-COFT exercises comprising 23 different moving (offensive) and stationary (defensive) engagements against both moving and stationary, single and multiple targets. Special instructions were developed for U-COFT Instructors/Operators. Hit rate was identified as the most appropriate composite measure of gunnery performance. Instructions were prepared for calculating hit rate for each engagement in the test and for calculating hit rate for the test as

a whole. Additional measures were identified for supplementary analysis of performance. These include firing rate, hit probability, average opening time, average miss distance, and average numbers of classification and system management errors. Use of this test should facilitate our ability to integrate research in tank gunnery and thereby increase our understanding of performance requirements in tank gunnery.

TR 860 Training Procedures for Enhancing Reserve Component Learning, Retention, and Transfer, Wells, R.; Hagman, J.D. September 1989 (AD A217 450) This report summarizes the results of an extensive literature survey conducted to provide the U.S. Army National Guard and Reserve, i.e., the Reserve Component (RC), with practicable information on how to train for enhanced soldier performance. general training procedures or strategies are recommended for improving the learning, retention, and transfer od verbal and perceptual skills. When incorporated by the military training developer and applied on a task-by-task basis by the RC trainer, these general procedures will help to ensure maximum payoff from the training resources invested.

TR 861 Nationwide Survey of Soldier Perceptions of Reserve Component (RC) Training, Eisley, M.; Viner, M.P. September 1989 (AD A217 639) Effective and efficient Reserve Component (RC) training is of paramount importance under Total Force Policy. Relative to Active Component (AC) training, however, RC training presents unique challenges. RC soldiers must overcome greater small-unit geographical dispersion and train with less time, mission-essential equipment, and access to major training or maneuver areas than their AC counterparts. This report contains the results of a random survey of 5,916 Army National Guard (ARNG) and U.S. Army Reserve (USAR) soldiers. The survey was designed to identify the kinds of problems encountered in the RC environment during Inactive Duty training (IDT) and to offer solutions to the problems. Overall, RC soldiers indicated that IDT suffers from a lack of time and realism. They suggested that currently available training time could be used more efficiently by increasing emphasis on the use of hip-pocket or oportunity training, providing officers and noncommissioned officers with paid time outside of drills for planning purposes, and reducing or reallocating unit nontraining requirements. A variety of options for increasing the amount of available training time were also endorsed. These options focused on individual skill development and included the notions of self-contained training and seasonal active duty. In regard to training realism, most soldiers agreed that more realistic training could be achieved through increased availability of wartime equipment and greater of use simulators and training devices. Results of the survey suggest that improved training could reduce attrition and promote readiness.

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Abbreviations

RN   Reseach Note
RP   Research Product

RR   Research Report
TR   Technical Report

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